


THE RECORD OF DISCUSSIONS
BETWEEN THE JAPANESE IMPLEMENTATION SURVEY TEAM
AND THE AUTHORITIES CONCERNED OF
THE GOVERNMENT OF THE ISLAMIC REPUBLIC OF PAKISTAN
ON THE JAPANESE TECHNICAL COOPERATION FOR THE GENETIC
RESOURCES PRESERVATION AND RESEARCH LABORATORY PROJECT
IN THE ISLAMIC REPUBLIC OF PAKISTAN

The Japanese Implementation Survey Team (hereinafter referred to as "the team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Dr. Nobuo Murata visited the Islamic Republic of Pakistan from March 5 to March 15, 1993 for the purpose of working out the details of the technical cooperation programme concerning the Genetic Resources Preservation and Research Laboratory Project.

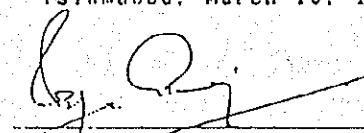
During its stay in the Islamic Republic of Pakistan, the Team exchanged views and had a series of discussions with the authorities concerned of the Islamic Republic of Pakistan in respect of the desirable measures to be taken by both Governments for the successful implementation of the above-mentioned Project.

As a result of the discussions, the Team and the authorities concerned of the Islamic Republic of Pakistan agreed to recommend to their respective Governments the matters referred to in the document attached hereto.

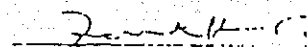
Islamabad, March 13, 1993



Dr. Nobuo Murata
Leader,
Implementation Survey Team,
Japan International
Cooperation Agency,
Japan



Dr. Zafar Altaf
Additional Secretary
In-charge,
Agricultural Research Division,
/Chairman,
Pakistan Agricultural Research
Council,
Ministry of Food, Agriculture
and Cooperatives,
The Islamic Republic of Pakistan



Farhat Hussain
Joint Secretary
Economic Affairs Division,
Ministry of Finance and Economic Affairs,
The Islamic Republic of Pakistan

THE ATTACHED DOCUMENT

I. COOPERATION BETWEEN BOTH GOVERNMENTS

1. The Government of Japan and the Government of the Islamic Republic of Pakistan will cooperate with each other in implementing the Genetic Resources Preservation and Research Laboratory Project (hereinafter referred to as "the Project") for promoting crop improvement in Pakistan through activities such as collection, evaluation, preservation, documentation and distribution of plant genetic resources.

2. The Project will be carried out at the Genetic Resources Preservation and Research Laboratory (GRPRL) which has been strengthened by the Japanese grant aid agreed between the two Governments by the Exchange of Notes dated on July 30, 1991.

3. The Project will be implemented in accordance with the Master Plan which is given in Annex I.

II. DISPATCH OF JAPANESE EXPERTS

1. In accordance with the laws and regulations in force in Japan, the Government of Japan will take the necessary measures through JICA to provide at its own expense the services of the Japanese experts as listed in Annex II through the normal procedures under the Colombo Plan Technical Cooperation Scheme.

2. The Japanese experts referred to in paragraph 1 above and their families will be granted in the Islamic Republic of Pakistan privileges, exemptions and benefits no less favorable than those accorded to experts of third countries or of international organizations such as the United Nations who are working in the Islamic Republic of Pakistan.

III. PROVISION OF MACHINERY AND EQUIPMENT

1. In accordance with the laws and regulations in force in Japan, the Government of Japan will take the necessary measures through JICA to provide at its own expense such machinery, equipment and other materials (hereinafter referred to as "the Equipment") necessary for the implementation of the Project as listed in Annex III through the normal procedures under the Colombo Plan Technical Cooperation Scheme.

2. The Equipment will become the property of the Government of the Islamic Republic of Pakistan upon being delivered C.I.F. to the Pakistani authorities concerned at the ports and/or airports of the disembarkation, and will be utilized exclusively for the implementation of the Project in consultation with the Japanese experts referred to in Annex II

IV. TRAINING OF PAKISTANI PERSONNEL IN JAPAN

1. In accordance with the laws and regulations in force in Japan, the Government of Japan will take the necessary measures through JICA to receive at its own expense the Pakistani personnel connected with the Project for technical training in Japan through the normal procedures under the Colombo Plan Technical Cooperation Scheme.

2. The Government of the Islamic Republic of Pakistan will take the necessary measures to ensure that the knowledge and experience acquired by the Pakistani personnel who have received technical training in Japan will be utilized effectively in the implementation of the Project.

V. SERVICES OF PAKISTANI COUNTERPART AND ADMINISTRATIVE PERSONNEL

1. In accordance with the laws and regulations in force in the Islamic Republic of Pakistan, the Government of the Islamic Republic of Pakistan will take necessary measures to secure at its own expense the necessary services of Pakistani counterpart and administrative personnel as listed in Annex IV.

2. The Government of the Islamic Republic of Pakistan will allocate the necessary number of suitably qualified personnel corresponding to each Japanese expert to be dispatched by the Government of Japan, as specified in Annex II for the effective and successful transfer of technology under the Project.

VI. MEASURES TO BE TAKEN BY THE GOVERNMENT OF THE ISLAMIC REPUBLIC OF PAKISTAN

1. In accordance with the laws and regulations in force in the Islamic Republic of Pakistan, the Government of the Islamic Republic of Pakistan will take necessary measures to provide at its own expense:

- (1) Land, buildings and facilities as listed in Annex V,
- (2) Supply or replacement of equipment, machinery, instruments, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than the Equipment provided through JICA under III above,
- (3) Transportation facilities and travel allowances for the official travel of Japanese experts within the Islamic Republic of Pakistan,
- (4) Suitably furnished accommodations for the Japanese experts and their families.

2. In accordance with the laws and regulations in force in the Islamic Republic of Pakistan, the Government of the Islamic Republic of Pakistan will take the necessary measures to meet:

(1) Expenses necessary for the transportation of the Equipment within the Islamic Republic of Pakistan, as well as for the installation, operation and maintenance thereof.

(2) Customs duties, internal taxes and any other charges imposed on the Equipment in the Islamic Republic of Pakistan.

(3) All running expenses necessary for the implementation of the Project.

VII. ADMINISTRATION OF THE PROJECT

1. The Chairman of the Pakistan Agricultural Research Council (PARC) will bear overall responsibility for the implementation of the Project.

2. The Head of GRPRL, as Project Manager, will be responsible for the administrative and managerial matters of the Project.

3. The Japanese Team Leader will provide necessary recommendations and advice on technical and administrative matters concerning the implementation of the Project to the Project Manager.

4. Japanese experts will give necessary technical guidance and advice to Pakistani counterpart personnel on matters pertaining to the implementation of the Project.

5. For the effective and successful implementation of the Project, a Joint Committee will be established whose function and composition are referred to in Annex VI.

VIII. CLAIMS AGAINST JAPANESE EXPERTS

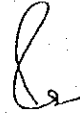
The Government of the Islamic Republic of Pakistan undertakes to bear claims, if any arises, against the Japanese experts engaged in the Project, resulting from, occurring in the course of, or otherwise connected with the discharge of their official functions in the Islamic Republic of Pakistan except for those arising from the willful misconduct or gross negligence of the Japanese experts.

IX. MUTUAL CONSULTATION

There will be mutual consultation between the two Governments on any major issues arising from, or in connection with this Attached Document.

X. TERM OF COOPERATION

The duration of the technical cooperation for the Project under this Attached Document will be five (5) years from June 1, 1993.



Adm.


Annex I MASTER PLAN

I. OBJECTIVE OF THE PROJECT

The Project aims at strengthening the activities and establishing effective methods through transfer of technology for collection, evaluation, preservation, documentation and distribution of plant genetic resources of crop plants, mainly cereals and grain legumes for future contribution to crop improvement in the Islamic Republic of Pakistan.

II. ACTIVITIES OF THE PROJECT

The following cooperation activities will be implemented in order to attain the above-mentioned objective.

- (1) Exploration and Collection
 - (2) Introduction and Seed health
 - (3) Seed and In-vitro preservation
 - (4) Germplasm multiplication and rejuvenation
 - (5) Germplasm evaluation
 - (6) Data management
 - (7) Genebank management
- 

Annex II JAPANESE EXPERTS

1. Team Leader
2. Coordinator
3. Experts in the fields of:
 - (1) Seed health
 - (2) Seed preservation
 - (3) Genebank management

Note: (1) Short-term experts will be dispatched when the need arises, for the smooth implementation of the Project.

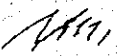
(2) The Team Leader may serve concurrently as one of the above-mentioned experts.



1/1/77

Annex III LIST OF THE EQUIPMENT

1. Machinery and equipment necessary for the activities mentioned in Annex I
2. Books and other printed matter necessary for the activities mentioned in Annex I
3. Other necessary equipment and materials mutually agreed upon



Annex IV LIST OF PAKISTANI COUNTERPART AND ADMINISTRATIVE PERSONNEL

1. Head of the Genetic Resources Preservation and Research Laboratory (GRPRL)
2. Deputy Head of the Genetic Resources Preservation and Research Laboratory (GRPRL)
3. Full-time Counterpart Personnel in the fields of:
 - (1) Seed Health
 - (2) Seed Preservation
 - (3) Genebank management
 - (4) Other fields mutually agreed upon as necessary
4. Full-time Administrative and Technical personnel:
 - (1) Administrative Officer
 - (2) Technicians and Laboratory Assistants
 - (3) Clerical and Administrative staff
 - (4) Typists
 - (5) Drivers
 - (6) Other necessary staff
5. Other necessary personnel mutually agreed upon

Note: (1) The Deputy Head of GRPRL may act as a counterpart scientist in the Project.

(2) The accounts will be maintained by the Central Account Department of National Agricultural Research Center (NARC).

le

1/11/77

Annex V LIST OF LAND, BUILDING AND FACILITIES

1. Land, building and facilities for the Project
2. Rooms and space necessary for the installation and storage of machinery, equipment and materials provided by the Government of Japan
3. Office space and necessary facilities for the Japanese Team Leader, Coordinator and Experts
4. Other facilities mutually agreed upon as required



Annex VI THE JOINT COMMITTEE

1. Functions

The Joint Committee will meet at least once a year and whenever the need arises, and work:

- (1) To formulate the Annual Work Plan of the Project.
- (2) To review the overall progress of the Project as well as the achievements of the above-mentioned Annual Work Plan.
- (3) To review and exchange views on major issues arising from or in connection with the Project.

2. COMPOSITION

(1) Chairman:

Chairman, Pakistan Agricultural Research Council (PARC)

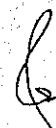
(2) Pakistani Side:

- 1) Member (Crop Sciences), Pakistan Agricultural Research Council (PARC)
- 2) Director General, National Agricultural Research Center (NARC)
- 3) Director, Plant Genetic Resources Institute
- 4) Director, Crop Sciences Institute
- 5) Head and Deputy Head, the Genetic Resources Preservation and Research Laboratory (GRPRI)
- 6) Deputy Secretary, Agricultural Research Division
- 7) Representative, Economic Affairs Division
- 8) Director (Planning), PARC
- 9) Other personnel nominated by the Chairman

(3) Japanese Side:

- 1) Team Leader
- 2) Coordinator
- 3) Experts
- 4) The Representative of the JICA Pakistan Office
- 5) Personnel dispatched by JICA Headquarters, if necessary.

Note: Official(s) of the Embassy of Japan may attend the joint committee as observer(s).



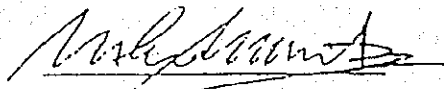
AM

TENTATIVE SCHEDULE OF IMPLEMENTATION
ON
THE TECHNICAL COOPERATION
FOR
THE GENETIC RESOURCES PRESERVATION
AND RESEARCH LABORATORY PROJECT
IN THE ISLAMIC REPUBLIC OF PAKISTAN

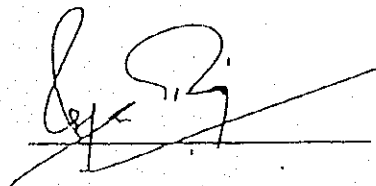
Within the scope of the Record of Discussions signed on March 13, 1993, the Japanese Implementation Survey Team and the authorities concerned of the Islamic Republic of Pakistan have jointly formulated the Tentative Schedule of Implementation for the Genetic Resources Preservation and Research Laboratory Project in the Islamic Republic of Pakistan (hereinafter referred to as "the Project") as annexed hereto.

This Tentative Schedule of Implementation is subject to the condition that the necessary budget will be allocated for the Project and also subject to change within the framework of the Record of Discussions when necessity arises in the course of the implementation of the Project.

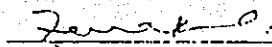
Islamabad, March 13, 1993



Dr. Nobuo Murata
Leader,
Implementation Survey
Team, Japan International
Cooperation Agency,
Japan



Dr. Zafar Altaf
Additional Secretary In-charge,
Agricultural Research Division,
/Chairman,
Pakistan Agricultural Research
Council,
Ministry of Food, Agriculture
and Cooperatives,
The Islamic Republic of Pakistan



Farhat Hussain,
Joint Secretary,
Economic Affairs Division,
Ministry of Finance and Economic Affairs,
The Islamic Republic of Pakistan

Activities of the Project

| Item | Fiscal year | 1st '93 | 2nd '94 | 3rd '95 | 4th '96 | 5th '97 |
|--|-------------|---------|---------|---------|---------|---------|
| I. GENETIC RESOURCES PROGRAMME | | | | | | |
| 1. Exploration and Collection | | | | | | |
| 2. Introduction and Seed health | | | | | | |
| 3. Seed and In-vitro preservation | | | | | | |
| 4. Germplasm multiplication and rejuvenation | | | | | | |
| 5. Germplasm evaluation | | | | | | |
| 6. Data management | | | | | | |
| 7. Genebank management | | | | | | |

1/11/97

[Signature]

Technical Cooperation Programme (Japanese side)

| Item | Fiscal year | 1st '93 | 2nd '94 | 3rd '95 | 4th '96 | 5th '97 |
|------|-------------|---------|---------|---------|---------|---------|
|------|-------------|---------|---------|---------|---------|---------|

I. DISPATCH OF EXPERTS

1. Long-term assignment

- (1) Team leader _____
- (2) Coordinator _____
- (3) Experts on:
 - a) Seed health _____
 - b) Seed preservation _____
 - c) Genebank management _____

2. Short-term assignment

Short-term experts will be dispatched when the need arises, for the smooth implementation of the Project.

II. TRAINING OF PAKISTANI PERSONNEL IN JAPAN _____

III. PROVISION OF MACHINERY AND EQUIPMENT _____

1/11/11



Technical Cooperation Programme (Pakistani side)

| Item | Fiscal year | 1st '93 | 2nd '94 | 3rd '95 | 4th '96 | 5th '97 |
|---|-------------|-----------------------|---------|---------|---------|---------|
| I. ASSIGNMENT OF COUNTERPARTS AND ADMINISTRATIVE PERSONNEL | | | | | | |
| 1. Head of the Project | | ----- | | | | |
| 2. Deputy Head of the Project | | ----- | | | | |
| 3. Counterpart personnel in the following fields: | | | | | | |
| a) Seed health | | ----- | | | | |
| b) Seed preservation | | ----- | | | | |
| c) Genebank management | | ----- | | | | |
| d) Other fields | | When the need arises. | | | | |
| 4. Administrative personnel | | | | | | |
| a) Administrative officer | | ----- | | | | |
| b) Other officers | | ----- | | | | |
| II. PROVISION OF LAND, BUILDING AND OTHER NECESSARY FACILITIES | | | | | | |
| ----- | | | | | | |
| III. ALLOCATION OF RUNNING COST OF THE PROJECT | | | | | | |
| ----- | | | | | | |

167.

MINUTES OF DISCUSSIONS
BETWEEN THE JAPANESE CONSULTATION SURVEY TEAM
AND
THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF THE ISLAMIC REPUBLIC OF PAKISTAN
ON
THE GENETIC RESOURCES PRESERVATION AND RESEARCH LABORATORY PROJECT
IN THE ISLAMIC REPUBLIC OF PAKISTAN

The Japanese Consultation Survey Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency and headed by Dr. Tsukasa Nagamine visited the Islamic Republic of Pakistan from March 17 to March 28, 1994 in order to formulate the Detailed Implementation Plan (hereinafter referred to as "DIP") under the Tentative Schedule of Implementation (hereinafter referred to as "TSI") signed on March 13, 1993 for the technical cooperation for the Genetic Resources Preservation and Research Laboratory Project in the Islamic Republic of Pakistan (hereinafter referred to as "the Project") as well as to discuss major issues related to the implementation of the Project.

During their stay in the Islamic Republic of Pakistan, the Team exchanged views and had a series of discussions with the authorities concerned.


As a result of the discussions, both parties agreed to recommend to their respective Governments that the Major Points of Understanding as attached in ANNEX I be examined and the necessary steps be taken accordingly towards the smooth and successful implementation of the Project.

Both parties have also jointly worked out DIP for the Project in order to give possible and appropriate clarification to TSI as attached in ANNEX II at this stage of the Project. DIP is subject to change within the framework of the Record of Discussions signed on March 13, 1993 for the Project when necessity arises in the course of implementation of the Project.

Islamabad, March 24, 1994

長峰 司

Dr. Tsukasa Nagamine
Leader,
The Consultation Survey Team,
Japan International
Cooperation Agency, Japan


Dr. Zafar Ailaf
Additional Secretary In-charge,
Agricultural Research Wing,
/Chairman,
Pakistan Agricultural Research
Council,
Ministry of Food, Agriculture
and Cooperatives, The Islamic
Republic of Pakistan

Mr. Farhat Hussain
Joint Secretary,
Economic Affairs Division,
Ministry of Finance and Economic Affairs,
The Islamic Republic of Pakistan

Major Points of Understanding

1. Input Activities

(1) Japanese side

a) Dispatch of experts

Three long-term experts have been dispatched to the Project and one more will come in April, 1994. Three short-term experts have also been dispatched up to now.

b) Provision of equipment

Equipment for the first year amounting to 40 million Japanese yen is scheduled to arrive in Pakistan in July, 1994.

c) Counterpart training

Two counterpart personnel were accepted for training in Japan up to now.

(2) Pakistani side

a) Staff assignment

Forty seven staff members have been assigned to the Project including 13 scientists. Two scientists are to join in the near future in Germplasm Evaluation and In-vitro Preservation Laboratories.

b) Budget allocation

After the handing-over of the facilities of the Genetic Resources Preservation and Research Laboratory (hereinafter referred to as "GRPRL") to the Government of Pakistan (hereinafter referred to as "GOP"), the project completion procedures have been processed.

Simultaneously, Ministry of Finance of GOP has approved and released Rs. 5.0 million as recurring expenditure for the smooth functioning of the Project in accordance with PG-1 for GRPRL.

The amount of Rs. 5.0 million was provided in addition to the regular budget of 1.129 million for the fiscal year 1993-1994.

2. Project Activities

(1) Both sides confirmed that the term "Genebank management" used in the Project covers whole activities listed in DIP, and especially deals with the matter to promote coordination among areas of activities within GRPRL.

(2) Both sides understood that the "item of work" listed in DIP are cooperative activities jointly conducted by both sides. Other activities including routine operation of the Genebank is the responsibility of Pakistani side.

3. Administration and Management

(1) Both sides confirmed that Japanese cooperation under Project Type Technical Cooperation scheme aims at strengthening the activities of the Genebank within the GRPRL Project through the technical transfer to Pakistani counterpart scientists and officers. The cooperation needs to be carried out based on the Record of Discussions signed on March 13, 1993.

F. 17

(2) Based on the Record of Discussions, both sides confirmed the followings;

a) For the smooth implementation of the cooperative activities, Pakistani side will secure at its own expense the necessary service of Pakistani counterpart scientists, administrative and technical personnel including technicians and laboratory assistants.

b) For the smooth implementation of the cooperative activities, Pakistani side will bear all running expenses necessary for the Project. Operational fund for GRPRL has been provided by GOP. All running cost including utilities has to be paid by GOP.

c) Japanese contributions to the project are;

① dispatch of experts,

② provision of machinery and equipments,

③ training of Pakistani personnel in Japan.

There is no direct monetary assistance for the operation of the Project included in the Japanese contributions. However, some fund for special activities such as seminar and publication for dissemination of the Project output may be available, when necessary and mutually agreed upon. Such fund will be managed by the Japanese expert team in consultation with Pakistani counterparts.

長峰

Detailed Implementation Plan for the Genetic Resources Preservation and Research Laboratory Project
 1. Technical cooperation period of each item of work

| Item of work | 1st year | 2nd year | 3rd year | 4th year | 5th year |
|---|----------|----------|----------|----------|----------|
| 1. EXPLORATION AND COLLECTION (1) Investigation on distribution pattern of plant genetic diversity in Pakistan (2) Determination of priorities of collection (3) Establishment of methodologies of exploration and collection 2. INTRODUCTION AND SEED HEALTH (1) Introduction of plant genetic resources from abroad (2) Identification and indexing of seedborne pathogens (3) Effect of contamination by pathogens on seed longevity (4) Influence of propagation on incidence of seedborne pathogens in germplasm collections 3. SEED AND IN-VITRO PRESERVATION (1) Seed preservation a) Improvement of seed storage procedures b) Assessment of seed longevity in the Genebank (2) In-vitro and cryo-preservation a) Establishment of long-term in-vitro germplasm preservation b) Study on long-term cryo-preservation of germplasm 4. GERMPASM MULTIPLICATION AND REJUVENATION (1) Standardization of multiplication techniques of cross pollinating crop plants (2) Multiplication of germplasm with decreased viability and quantity 5. GERMPASM EVALUATION (1) Preliminary evaluation (2) Detailed evaluation of crop germplasm (3) Biochemical evaluation 6. DATA MANAGEMENT (1) Establishment of database system for documentation of genetic resources information (2) Computerization of information on stored germplasm (3) Publication of germplasm catalogues 7. GENE BANK MANAGEMENT (1) Strategy for operation of genebank activities and research (2) Exchange of genetic resources information with domestic research institutions | | | | | |

15.12.0

2. Detailed description of cooperative activities

| Item of work | Objectives | Brief description of work | Expected achievement | Assessment |
|---|---|--|---|----------------------------------|
| 1. EXPLORATION AND COLLECTION (1) Investigation on distribution pattern of plant genetic diversity in Pakistan | To assess the magnitude of genetic diversity and prepare distribution maps | To make a distribution map of plant genetic resources of various plant species distributed based on the information in the passport data file on stored germplasm | To make a distribution map of plant genetic resources required for the exploration throughout the country | Study of the map established |
| (2) Determination of priorities of collection | To determine the crop priorities for collection | To assess the priority of species and regions to be explored depending upon the rate of genetic erosion and importance of crops in the country | To determine the priorities of collection of major crop species | Study of priority table |
| (3) Establishment of methodologies of explorative and collection | To standardize the efficient collecting methods capturing maximum genetic diversity | To establish a systematic methods of genetic resources exploration and collections such as methods of recording the collection sites, description items and procedures, appropriate handling of collected materials and processing of passport data showing the origins of the materials | To establish efficient methods of exploration and collection | Study of established methodology |
| 2. INTRODUCTION AND SEED HEALTH (1) Introduction of plant genetic resources from abroad | To acquire exotic germplasm having high priorities | To promote introduction of plant germplasm useful but not available within the country from abroad including Japan | To introduce and acclimatize genetic resources from abroad | Study of introduced germplasm |

長峰

| | | | | |
|---|---|--|---|--|
| (2) Identification and indexing of seedborne pathogens | To identify and index seedborne pathogens in crop germplasm | To identify and index pathogen contamination of plant germplasm using morphological and biochemical approaches | To identify major seedborne pathogens and establish efficient systems for indexing | Study of the systems established and publication |
| (3) Effect of contamination by pathogens on seed longevity | To determine seed viability losses due to seed infestation | To investigate the effect of selected seedborne pathogens on the longevity of seeds stored in the genebank | To elucidate the effect of contamination by seedborne pathogens on the seed longevity | Publication of results |
| (4) Influence of propagation on incidence of seedborne pathogens in germplasm collections | To find out appropriate practices to minimize seedborne contamination | To propagate the contaminated germplasm collections of specific crops in field and greenhouse with appropriate protective measures and to study the effect of propagation conditions on the incidence of seed contamination after multiplication | To investigate the disease free propagation method | Publication and techniques developed |
| 3. SEED AND IN-VITRO PRESERVATION | | | | |
| (1) Seed preservation | To standardize the procedures for seed storage | To explore the optimum conditions of seed storage of selected plant species and to improve the storage procedures | To establish the optimum seed storage conditions | Study of improved procedures |
| b) Assessment of seed longevity in the genebank | To study the seed longevity under the present storage conditions | To monitor the viability and vigor of seeds, transferred from the old facilities and newly collected materials and to process samples for proper storage and to maintain genetic stock database | To establish the method for assessing seed viability under the storage condition | Study of estimation method |

長年

| | | | | |
|--|--|---|--|--|
| <p>(2) In-vitro and cryo-preservation</p> <p>a) Establishment of long-term in-vitro germplasm preservation</p> | <p>To develop techniques for in-vitro preservation of vegetatively propagated crops</p> | <p>To investigate the in-vitro preservation techniques of germplasm of vegetatively propagated plants such as potato, sweet potato and fruits</p> | <p>To establish in-vitro germplasm preservation techniques</p> | <p>Study of techniques established and publication</p> |
| <p>b) Study of long-term cryo-preservation of germplasm</p> | <p>To develop and standardize cryo-preservation techniques for vegetatively propagated plant species</p> | <p>To investigate the techniques of cryo-preservation of germplasm</p> | <p>To investigate the possibility of cryo-preservation of germplasm</p> | <p>Study of trials</p> |
| <p>4. GERmplasm MULTIPLICATION AND REJUVENATION</p> | | | | |
| <p>(1) Standardization of multiplication techniques of cross pollinating crop plants</p> | <p>To find appropriate methods for seed multiplication of cross pollinating crop species</p> | <p>To investigate the seed multiplication techniques of cross pollinating crop for minimizing genetic distortion</p> | <p>To standardize seed multiplication techniques for cross pollinating crop plants</p> | <p>Study of techniques established</p> |
| <p>(2) Multiplication of germplasm with decreased viability and quantity</p> | <p>To multiply and rejuvenate crop germplasm</p> | <p>To investigate methods for multiplying germplasm with decreased viability and difficult to multiply</p> | <p>To improve the method of multiplication of germplasm</p> | <p>Study of techniques improved</p> |
| <p>5. GERmplasm EVALUATION</p> | | | | |
| <p>(1) Preliminary evaluation</p> | <p>To characterize germplasm for agro-morphological traits</p> | <p>To determine the characters to be evaluated of the crop species of high priority in reference to ICGRI descriptors and national needs</p> | <p>To establish the method of preliminary evaluation of germplasm</p> | <p>Study of evaluation format</p> |
| <p>(2) Detailed evaluation of crop germplasm</p> | <p>To screen the germplasm for biotic and abiotic stresses</p> | <p>To determine the agronomic characters to be evaluated such as resistance to drought, salinity, diseases and pests</p> | <p>To establish the method of agronomic evaluation of germplasm</p> | <p>Study of results</p> |

60

| | | | | |
|---|--|---|---|--|
| (3) Biochemical evaluation | To identify and classify the genetic diversity based upon biochemical analysis | To perform biochemical evaluation using techniques such as electrophoretic analysis of proteins and DNA | To utilize methods of biochemical evaluation for identification of wild relative species and to assess intra-specific diversity | Publication of results |
| 5. DATA MANAGEMENT | | | | |
| (1) Establishment of database system for documentation of genetic resources information | To establish database for retrieval and efficient utilization | To establish databases on germplasm such as passport data, storage data, and evaluation data | To establish database for plant genetic resources management | Relevance of database and format established |
| (2) Computerization of information on stored germplasm | To compile and sort data for users | To perform computer-input of information on stored germplasm such as passport data, evaluation data and information | To establish a computer file of documents on germplasm such as passport data and evaluation data and to promote the utilization of such information | Publication and technical reports |
| (3) Publication of germplasm catalogues | To promote the utilization of stored germplasm | To publish germplasm catalogues | To disseminate information to users | Study of the catalogues published |
| 7. GENE BANK MANAGEMENT | | | | |
| (1) Strategy for operation of genebank activities and research | To establish efficient genebank operation | To set the priorities of genebank operation and research and to strengthen them through coordination among the areas of activities | To systematize the procedures of genebank management | Study of activities |
| (2) Exchange of genetic resources information with domestic research institutions | To share genetic resources information with domestic institutions | To promote the linkage of GRPRL with other domestic research institutions working on plant genetic resources through organizing workshop/seminars, etc. | To strengthen linkage of GRPRL with other domestic research institutions | Proceedings and recommendations of workshop/seminars |

Note: "Expected achievement" is defined as outcome to be obtained in each item of work through cooperative activities within the five year Project. "Objectives" are defined as final goal in each item of work including those to be attained in a longer time span.

長年

ANNEX 2.1 DISPATCH OF JAPANESE EXPERTS AND TRAINING OF PAKISTANI PERSONEL IN JAPAN

1) LONG-TERM EXPERTS

| | | |
|----------------------|-------------------------------|-----------------------------|
| Dr. Murata, Nobuo | Leader Genebank Management | 18 Jun.,1993 - 17 Oct.,1995 |
| Dr. Gamō, Takuma | Leader Genebank Management | 25 Sep.,1995 - 31 May,1998 |
| Dr. Hiroyasu, Sato | Seed Preservation | 9 Jul.,1993 - 31 May,1998 |
| Mr. Mitsueda, Takao | Seed Health | 7 Apr.,1994 - 31 May,1998 |
| Mr. Nishikawa, Shoji | Coordinator | 11 Jun.,1993 - 10 June,1995 |
| Mr. Kimura, Kenji | Coordinator | 12 Jun.,1995 - 31 May,1998 |

2) SHORT-TERM EXPERTS

| | | |
|-----------------------------|-----------------------------|-----------------------------|
| 1993 (Japanese Fiscal Year) | | |
| Dr. Amma, Shun | Evaluation, Record of Data | 12 Nov.,1993 - 13 Feb.,1994 |
| Dr. Ashizawa, Masakazu | Collection of Germplasm | 21 Mar.,1994 - 17 Apr.,1994 |
| Dr. Iketani, Hiroyuki | In-vitro Preservation | 18 Feb.,1994 - 20 Mar.,1994 |
| 1994 (Japanese Fiscal Year) | | |
| Mr. Haji, Takashi | Collection of Germplasm | 14 Jul.,1994 - 7 Aug.,1994 |
| Dr. Amma, Shun | Standardization of Database | 4 Nov.,1994 - 1 Mar.,1995 |
| Mr. Yamamori, Makoto | Evaluation of Germplasm | 10 Feb.,1995 - 5 Mar.,1995 |
| Dr. Nozu, Yuzou | Seed Health | 20 Mar.,1995 - 16 Apr.,1995 |
| 1995 (Japanese Fiscal Year) | | |
| Mr. Terai, Osamu | Collection of Germplasm | 4 Aug.,1995 - 10 Sep.,1995 |
| Mr. Miyake, Masanori | Virus free technique | 4 Aug.,1995 - 10 Sep.,1995 |
| Dr. Nozu, Yuzou | Seed Health | 4 Aug.,1995 - 10 Sep.,1995 |
| Mr. Nakamura, Seiji | Setting up of Equipment | 4 Dec.,1995 - 24 Apr.,1995 |
| Dr. Amma, Shun | Computer Networking | 2 Feb.,1996 - 2 Apr.,1996 |
| Mr. Kiyota, Seiichiro | Biochemical Evaluation | 19 Feb.,1996 - 24 Mar.,1996 |
| Mr. Noguchi, Yuji | Repair of Ultracentrifuge | 26 Feb.,1996 - 4 Mar.,1996 |
| 1996 (Japanese Fiscal Year) | | |
| Dr. Yoshida, Hisasi | Collection of Germplasm | 27 May.,1996 - 23 Jun.,1996 |
| Mr. Kiura, Takuji | Computer System | 5 Jul,1996 - 1 Aug.,1996 |
| Dr. Kadowaki, Kouichi | Biochemical Evaluation | 18 Nov.,1996 - 16 Dec.,1996 |
| Mr. Takeya, Masaru | Data Management | 17 Feb.,1997 - 9 Mar.,1997 |
| Dr. Kaku, Hisatoshi | Identification of Bacteria | 2 Feb.,1997 - 9 Mar.,1997 |
| Mr. Kiura, Takuji | Computer System | 17 Feb.,1997 - 3 Mar.,1997 |

| | | |
|-----------------------------|------------------------|-----------------------------|
| 1997 (Japanese Fiscal Year) | | |
| Dr. Iizuka, Norio | Seed Health | 10 Nov.,1997 - 7 Dec.,1997 |
| Dr. Komatsu, Setsuko | Biochemical Evaluation | 10 Nov.,1997 - 28 Nov.,1997 |
| Dr. Oka, Narumi | Cryo-Preservation | 19 Jan.,1998 - 8 Feb.,1998 |
| Mr. Hayashi, Tadahiro | Computer System | 19 Jan.,1998 - 8 Jan., 1998 |
| Dr. Fujita, Masaya | Detailed Evaluation | 27 Feb.,1998 - 15 Mar.,1998 |

C/P TRAINING

| | | |
|-----------------------------|-----------------------------------|------------------------------|
| 1993 (Japanese Fiscal Year) | | |
| Dr. M. Shahid Masood | Evaluation of Germplasm | 13 Sept.,1993 - 21 Dec.,1993 |
| Mr. Shahzad Naseem | Evaluation of Germplasm | 13 Sept.,1993 - 21 Dec.,1993 |
| 1994 (Japanese Fiscal Year) | | |
| Mr. Sadar Uddin Siddiqui | In-vitro Preservation | 29 Aug.,1994 - 22 Jan.,1995 |
| Mr. Mohammad Sadiq Bhatti | Genebank Management | 5 Sep.,1994 - 12 Mar.,1995 |
| Mr. Muhammad Rashid | Maintenance of Facilities | 15 Nov.,1994 - 12 Mar.,1995 |
| 1995 (Japanese Fiscal Year) | | |
| Mr. Muhammad Arif | Group Training | 8 May,1995 - 3 Oct.,1995 |
| Mr. Abdul Qayyum | Data Management | 15 Nov.,1995 - 17 Dec.,1995 |
| Mr. Rashid Anwar | Evaluation of Wheat Diversity | 21 Jan.,1996 - 28 Apr.,1996 |
| Mr. Muhammad Munir | Genebank Operation | 25 May,1996 - 22 Sept.,1996 |
| 1996 (Japanese Fiscal Year) | | |
| Mr. Abdul Ghafoor | Group Training | 6 May,1996 - 1 Nov.,1996 |
| Mr. Muhammad Afzal | Biochemical Evaluation | 20 May,1996 - 17 Nov.,1996 |
| Dr. Muhammad Sarwar | Preservation of Recalcitrant Seed | 20 May,1996 - 8 Sep.,1996 |
| Mr. Zahar Riaz | Identification of Pathogens | 20 May,1996 - 15 Sep.,1996 |
| Dr. Muhammad Bashir | Detection of Plant Viruses | 16 Sep.,1996 - 18 Dec.,1997 |
| 1997 (Japanese Fiscal Year) | | |
| Dr. Zahoor Ahmad | Genebank Administration | 22 Jun.,1997 - 11 Jul.,1997 |
| Ms. Abida Akhtar | Production of Virus-free Plant | 6 Jun.,1997 - 20 Sep.,1997 |
| Miss Nayyar Kazmi | Design of Database | Mar.,1998 - July,1998 |

Annex 2.2 : Provision of Equipment from JICA

By Japanese Fiscal Year (Unit: Yen)

| YEAR | FROM | NO. | EQUIPMENT | QUANTITY | UNIT PRICE, YEN | TOTAL PRICE, YEN | USE | MAINT-ENANCE | REMARKS |
|-------|----------|-----|---------------------------------|----------------|-----------------|------------------|-----------|--------------|-----------|
| 93 | JAPAN | 1 | MICROSCOPE OPTI PHOTO2 | 1 | 991,930 | 991,930 | B | A | |
| | | 2 | DRYER FOR ELECTROPHORESIS | 1 | 135,900 | 135,900 | A | A | |
| | | 3 | VACUUM PUMP ELECTROPHORESIS | 1 | 395,500 | 395,500 | A | A | |
| | | 4 | MICRO REFRIGERATED CENTRIFUGE | 2 | 1,551,000 | 3,102,000 | A | A | |
| | | 5 | ELECTROPHORESIS FOR PROTEIN | 3 | 91,467 | 274,400 | A | A | |
| | | 6 | AGAROSE ELECTROPHORESIS | 1 | 215,500 | 215,500 | A | A | |
| | | 7 | ELISA PLATE | 2 | 39,000 | 78,000 | A | A | |
| | | 8 | HOT AIR STERILIZER (DRY OVEN) | 1 | 410,000 | 410,000 | A | A | |
| | | 9 | ELECTRIC INCUBATOR | 2 | 1,122,000 | 2,244,000 | A | A | |
| | | 10 | CLEAN BENCH | 1 | 1,212,800 | 1,212,800 | A | A | |
| | | 11 | ULTRA PURE WATER PURIFIER | 1 | 648,000 | 648,000 | A | A | |
| | | 12 | LOOP CINCINATOR | 2 | 90,500 | 181,000 | A | A | |
| | | 13 | MIXER | 3 | 51,000 | 153,000 | A | A | |
| | | 14 | NEUBAUERS COUNTING CHAMBER | 5 | 26,400 | 132,000 | A | A | |
| | | 15 | MICROSCOPE | 2 | 339,000 | 660,000 | A | A | |
| | | 16 | GRAIN MOISTURE TESTER | 3 | 150,000 | 450,000 | A | A | |
| | | 17 | SOFT X-RAY APPARATUS | 1 | 3,198,000 | 3,198,000 | C | A | |
| | | 18 | ILLUMINATING INCUBATOR | 1 | 443,000 | 443,000 | A | A | |
| | | 19 | OTHERS | | | 5,173,824 | | | |
| | | | | TRANSPORTATION | | | 1,028,857 | | |
| 93 | PAKISTAN | 1 | COPIER | 1 | 572,794 | 572,794 | A | A | JICA TEAM |
| | | 2 | REFRIGERATOR | 2 | 83,771 | 167,542 | A | A | JICA TEAM |
| | | 3 | JEEP W/ SPARE PARTS (TROOPER) | 1 | 3,934,000 | 3,934,000 | A | A | JICA TEAM |
| | | 4 | JEEP (TROOPER) | 1 | 3,200,000 | 3,200,000 | A | A | JICA TEAM |
| | | 5 | MINI JEEP (VIPARA) | 1 | 2,857,175 | 2,857,175 | A | A | JICA TEAM |
| | | 6 | WORD PROCESSOR (CE-1050) | 1 | 154,680 | 154,680 | A | A | JICA TEAM |
| TOTAL | | | | | | 32,013,902 | | | |
| 94 | JAPAN | 1 | PRE-FABRICATED SEED DRYER | 1 | 10,600,000 | 10,600,000 | C | A | |
| | | 2 | CAN SEALER | 1 | 3,778,000 | 3,778,000 | C | A | |
| | | 3 | PORTABLE GPS RECEIVER | 1 | 174,000 | 174,000 | A | A | |
| | | 4 | INCUBATOR | 1 | 883,800 | 883,800 | A | A | |
| | | 5 | INFRARED MOISTURE DETERMINATION | 2 | 595,000 | 1,190,000 | A | A | |
| | | 6 | ELECTRONIC BALANCE | 2 | 414,500 | 829,000 | A | A | |
| | | 7 | MICRO CENTRIFUGE | 1 | 1,560,510 | 1,560,510 | A | A | |
| | | 8 | ULTRA-LOW TEMP. FREEZER | 1 | 1,203,500 | 1,203,500 | A | A | |
| | | 9 | SPECTRO PHOTOMETER | 1 | 589,710 | 589,710 | A | A | |
| | | 10 | LAB MIXER | 3 | 50,000 | 150,000 | A | A | |
| | | 11 | MAGNETIC STIRRER | 2 | 39,600 | 79,200 | A | A | |
| | | 12 | ELECTROPHORESIS SYSTEM | 1 | 314,050 | 314,050 | A | A | |
| | | 13 | ELECTROPHORESIS SYSTEM | 1 | 129,000 | 129,000 | A | A | |
| | | 14 | ELECTROPHORESIS UNIT MU-PH-2 | 2 | 35,000 | 72,000 | A | A | |
| | | 15 | POLYETHYLENE SEALER | 2 | 79,500 | 159,000 | A | A | |
| | | 16 | MEDICAL REFRIGERATOR | 1 | 343,000 | 343,000 | A | A | |
| | | 17 | UV IRRADIATION APPARATUS | 1 | 929,100 | 929,100 | A | A | |
| | | 18 | DESK LAMP | 1 | 119,000 | 119,000 | A | A | |
| | | 19 | HOT STIRRER | 1 | 117,000 | 117,000 | A | A | |
| | | 20 | AUTO CLAVE | 1 | 659,700 | 659,700 | A | A | |
| | | 21 | FRY BLOCK | 1 | 14,700 | 14,700 | A | A | |

| YEAR | FROM | NO. | EQUIPMENT | QUANTITY | UNIT PRICE, YEN | TOTAL PRICE, YEN | USE | MAINTENANCE | REMARKS | |
|------|----------------|----------------|----------------------------------|-----------|-----------------|------------------|-----|-------------|---------|--|
| 94 | JAPAN | 2 2 | PORTABLE BENCH-TOP FREEZER | 3 | 49,000 | 147,000 | A | A | | |
| | | 2 3 | PERSONAL CENTRIFUGE | 2 | 38,000 | 76,000 | A | A | | |
| | | 2 4 | DOUBLE SHAKER | 2 | 201,000 | 402,000 | A | A | | |
| | | 2 5 | CENTRIFUGE EVAPORATOR | 1 | 702,000 | 702,000 | A | A | | |
| | | 2 6 | COOLING TRAP | 1 | 442,000 | 442,000 | A | A | | |
| | | 2 7 | GENOPIRATOR | 1 | 297,900 | 297,900 | A | A | | |
| | | 2 8 | FRYING OVEN | 1 | 247,000 | 247,000 | A | A | | |
| | | 2 9 | MICROSCOPE | 1 | 520,000 | 520,000 | A | A | | |
| | | 3 0 | OTHERS | | | 2,604,300 | | | | |
| | | TRANSPORTATION | | | 1,392,431 | | A | A | | |
| | PAKISTAN | 1 | FLY PROOF SCREEN | 189 | | 780,224 | | A | A | |
| | | 2 | ISOLATING CHAMBER FLAME | 2 | | 140,700 | | A | A | |
| | | 3 | VIRUS SERUM | 17 | | 135,300 | | A | A | |
| | | 4 | REGENT FOR ANTIBODY | 1 | 4,400 | 4,400 | | A | A | |
| | | 5 | PCR APPARATUS | 1 | 1,115,300 | 1,115,300 | | A | A | |
| | | 6 | SPATULA, WEIGHING BOAT | 11 | | 159,300 | | A | A | |
| | | 7 | CHEMICALS | 80 | | 1,305,200 | | A | A | |
| | | 8 | CHEMICALS | 14 | | 150,195 | | A | A | |
| | | 9 | CD ROM DRIVE | 1 | 726,000 | 726,000 | | A | A | |
| | TOTAL | | | | 35,267,059 | | | | | |
| 95 | JAPAN | 1 | GERMINATOR | 1 | 922,100 | 922,100 | A | A | | |
| | | 2 | CONDUCTIVITY METER | 1 | 158,000 | 158,000 | A | A | | |
| | | 3 | VACUUM SEALER | 1 | 140,100 | 140,100 | A | A | | |
| | | 4 | CO2 INCUBATOR/BIO CLEAN BENCH | 1 | 4,007,600 | 4,007,600 | A | A | | |
| | | 5 | AUTOClave | 1 | 4,517,800 | 4,517,800 | A | A | | |
| | | 6 | SPECTRO PHOTOMETER | 1 | 1,505,200 | 1,505,200 | A | A | | |
| | | 7 | INCUBATOR | 1 | 330,000 | 330,000 | A | A | | |
| | | 8 | ULTRA-LOW TEMP. FREEZER | 1 | 890,600 | 890,600 | A | A | | |
| | | 9 | MICRO TOME | 1 | 1,220,000 | 1,220,000 | A | A | | |
| | | 10 | CENTRIFUGAL EVAPORATOR | 1 | 891,300 | 891,300 | A | A | | |
| | | 11 | HYBRIDIZATION INCUBATOR | 1 | 462,400 | 462,400 | A | A | | |
| | | 12 | MEDICAL REFRIGERATOR | 1 | 200,000 | 200,000 | A | A | | |
| | | 13 | CRYO-BIOLOGICAL CONTAINER | 1 | 200,000 | 200,000 | A | A | | |
| | | 14 | FLUORO METER | 1 | 722,000 | 722,000 | A | A | | |
| | | 15 | POWER SUPPLY FOR ELECTROPHORESIS | 1 | 128,000 | 128,000 | A | A | | |
| | | 16 | ELECTROPHORESIS UNIT | 1 | 193,000 | 193,000 | A | A | | |
| | | 17 | FLUORESCENCE MICROSCOPE | 1 | 1,945,000 | 1,945,000 | A | A | | |
| | | 18 | INCUBATOR SHAKER | 1 | 814,000 | 814,000 | A | A | | |
| | | 19 | FILTERING KIT | 2 | 560,000 | 1,120,000 | | A | A | |
| | | 20 | WATER BATH SHAKER | 1 | 299,500 | 299,500 | | A | A | |
| | | 21 | TRANS ILLUMINATOR | 1 | 455,000 | 455,000 | | A | A | |
| | | 22 | CHROMATOGRAPHY | 1 | 1,754,300 | 1,754,300 | | A | A | |
| | | 23 | AUTOClave | 1 | 601,800 | 601,800 | | A | A | |
| | | 24 | HOMOGENIZER | 1 | 310,000 | 310,000 | | A | A | |
| | | 25 | LOOP CINCINATOR | 2 | 100,000 | 200,000 | | A | A | |
| | | 26 | PROTEIN ANALYZER | 1 | 3,307,538 | 3,307,538 | | A | A | |
| | | 27 | ELECTRO CELL FUSER | 1 | 1,060,000 | 1,060,000 | | A | A | |
| | | 28 | OTHERS | | | 1,975,298 | | | | |
| | TRANSPORTATION | | | 1,449,052 | | | | | | |

| YEAR | FROM | NO. | EQUIPMENT | QUANTITY | UNIT PRICE, YEN | TOTAL PRICE, YEN | USE | MAINTENANCE | REMARKS |
|------|----------|-------|-----------------------------|----------|-----------------|------------------|------------|-------------|---------|
| 95 | PAKISTAN | 1 | SERVER | 1 | 567,600 | 567,600 | A | A | |
| | | 2 | PERSONAL COMPUTER | 4 | 235,440 | 941,760 | A | A | |
| | | 3 | LINE PRINTER | 1 | 1,170,000 | 1,170,000 | A | A | |
| | | 4 | DOT PRINTER | 2 | 82,050 | 164,160 | A | A | |
| | | 5 | INTERNAL TAPE BACK-UP | 1 | 90,000 | 90,000 | A | A | |
| | | 6 | MAGNET OPTICAL DRIVE | 1 | 210,000 | 210,000 | A | A | |
| | | 7 | DIGITAL CAMERA | 1 | 81,000 | 81,000 | A | A | |
| | | 8 | DATA SHOW | 1 | 285,000 | 285,000 | A | A | |
| | | 9 | LAP-TOP COMPUTER | 1 | 336,000 | 336,000 | A | A | |
| | | 10 | COLOR SCANNER | 1 | 225,000 | 225,000 | A | A | |
| | | 11 | PERSONAL COMPUTER POWER MAC | 1 | 579,000 | 579,000 | A | A | |
| | | 12 | EXTERNAL HARD DISC | 1 | 195,000 | 195,000 | A | A | |
| | | 13 | DIGITIZER | 1 | 651,000 | 651,000 | A | A | |
| | | 14 | PLOTTER | 1 | 480,000 | 480,000 | A | A | |
| | | 15 | INK JET PRINTER | 1 | 99,000 | 99,000 | A | A | |
| | | 16 | DATA DRIVE | 1 | 240,000 | 240,000 | A | A | |
| | | 17 | COPIER | 1 | 858,600 | 858,600 | A | A | |
| | | 18 | OTHERS | | | | 3,542,889 | | |
| | | TOTAL | | | | | 42,509,604 | | |
| 96 | JAPAN | 1 | pH METER | 1 | 260,090 | 260,090 | | | |
| | | 2 | ELECTROPHORESIS APPARATUS | 1 | 254,600 | 254,600 | | | |
| | | 3 | ELECTROPHORESIS APPARATUS | 1 | 71,800 | 71,800 | | | |
| | | 4 | CHILLED WATER CIRCULATOR | 1 | 349,500 | 349,500 | | | |
| | | 5 | VACUUM DEICATOR | 1 | 61,800 | 61,800 | | | |
| | | 6 | CAN 100 SET (L) | 220 | 1,610 | 354,200 | | | |
| | | 7 | CAN 48 SET (M) | 583 | 610 | 343,430 | | | |
| | | 8 | HOT STIRRER | 1 | 61,800 | 61,800 | | | |
| | | 9 | VACUUM PUMP FOR GEL DRYER | 1 | 261,900 | 261,900 | | | |
| | | 10 | pH METER | 1 | 274,940 | 274,940 | | | |
| | | 11 | HYBRID OVEN | 1 | 540,240 | 540,240 | | | |
| | | 12 | MICRO PLATE READER | 1 | 708,360 | 708,360 | | | |
| | | 13 | MAGNETIC STIRRER | 2 | 50,500 | 101,000 | | | |
| | | 14 | PROTEIN BLOTTING APPARATUS | 1 | 927,560 | 927,560 | | | |
| | | 15 | HOT STIRRER | 1 | 57,740 | 57,740 | | | |
| | | 16 | MAGNETIC STIRRER | 2 | 11,550 | 23,100 | | | |
| | | 17 | WATER BATH | 1 | 70,500 | 70,500 | | | |
| | | 18 | MICRO-TUBE MIXER | 1 | 72,700 | 72,700 | | | |
| | | 19 | SHAKER | 1 | 105,450 | 105,450 | | | |
| | | 20 | ELECTROPHORESIS APPARATUS | 5 | 143,100 | 715,500 | | | |
| | | 21 | PCR APPARATUS | 1 | 956,760 | 956,760 | | | |
| | | 22 | GRASS CUTTING MACHINE | 1 | 65,960 | 65,960 | | | |
| | | 23 | MAX-MINI THERMOMETER | 4 | 5,670 | 22,680 | | | |
| | | 24 | ASPIRATING WATER PUMP | 5 | 3,262 | 16,310 | | | |
| | | 25 | NITO-CELLULOSE MEMBRANE | 5 | 14,200 | 71,000 | | | |
| | | 26 | pH METER ELECTRODE | 3 | 23,700 | 71,100 | | | |
| | | 27 | BURNER | 1 | 27,800 | 27,800 | | | |
| | | 28 | REFRIGERATOR | 1 | 839,500 | 839,500 | | | |
| | | 29 | BINDER | 1 | 444,400 | 444,400 | | | |
| | | 30 | THRESHER | 1 | 46,400 | 46,400 | | | |
| | | 31 | OTHERS | | | | 2,144,100 | | |

| YEAR | FROM | NO. | EQUIPMENT | QUANTITY | UNIT PRICE, YEN | TOTAL PRICE, YEN | USE | MAINTENANCE | REMARKS |
|------|----------|-----|--------------------------------|----------|-----------------|------------------|-----|-------------|---------|
| 96 | | | TRANSPORTATION | | | 1,523,898 | | | |
| | PAK | 1 | TEST-TUBE RACK | 10 | 1,500 | 15,550 | | | |
| | | 2 | CHEMICAL STORAGE CASE | 6 | 37,200 | 223,200 | | | |
| | TOTAL | | | | | 12,217,698 | | | |
| 97 | JAPAN | 1 | MAINTENANCE TOOL KIT | 1 | 75,000 | 75,000 | | | |
| | | 2 | LAB. TOOL KIT | 1 | 20,000 | 20,000 | | | |
| | | 3 | SPARE PARTS FOR LAB. EQUIPMENT | 10 | | 3,499,600 | | | |
| | | 4 | COMMON SPARE PARTS | 18 | | 498,900 | | | |
| | | 5 | CHEMICALS | 3 | | 30,300 | | | |
| | | | TRANSPORTATION | | | 617,070 | | | |
| | PAKISTAN | 1 | BACK-UP GENERATOR | 1 | 13,000,000 | 13,000,000 | | | |
| | | 2 | UPS | 1 | 78,000 | 78,000 | | | |
| | | 3 | DOT MATRIX PRINTER | 1 | 96,000 | 96,000 | | | |
| | | 4 | COLOR MONITOR | 1 | 45,000 | 45,000 | | | |
| | | 5 | DIGITAL CAMERA; ACCESSORIES | 6 | 17,100 | 17,100 | | | |
| | TOTAL | | | | | 17,966,970 | | | |
| | TOTAL | | | | | 139,975,233 | | | |

NOTE: Degree of appropriate usage of the equipment is indicated in the column 'USE' as follows;

- A = Very appropriate
- B = Appropriate
- C = Inappropriate

Degree of maintenance of the equipment is indicated in the column 'MAINTENANCE' as follows;

- A = Well maintained
- B = Normal
- C = Disorder or with trouble

The equipment procured in 1996 and 1997 has not arrived.

Annex 2.3 : Japanese Contribution, Local Running Costs and Others (Yen)

| FISCAL YEAR | 93 | 94 | 95 | 96 | 97 | 98 | TOTAL |
|-----------------------------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| GENERAL EXPENSES | 6,200,000 | 6,200,000 | 4,800,000 | 5,500,000 | 4,500,000 | 1,000,000 | 28,200,000 |
| SEMINARS | - | 995,000 | 720,000 | 886,000 | - | - | 3,495,000 |
| INTERNATIONAL SEMINAR | - | - | - | - | 3,923,000 | - | 3,923,000 |
| EXCHANGE OF TECHNOLOGY | - | - | 1,315,000 | - | 709,000 | - | 2,024,000 |
| CONSTRUCTION OF FIELD FENCE | - | - | 2,074,000 | - | - | - | 2,074,000 |
| TOTAL | 6,200,000 | 7,195,000 | 8,909,000 | 7,280,000 | 9,132,000 | 1,000,000 | 39,716,000 |

Annex 2.4: Pakistani Contribution, Operational Costs (Rs.)

| FISCAL YEAR | 93 | 94 | 95 | 96 | 97 | TOTAL |
|-----------------------------|-----------|-----------|-----------|-----------|----------------------|-----------------------|
| ESTABLISHMENT | 1,334,119 | 998,777 | 1,130,658 | 2,544,072 | | |
| TRANSPORTATION | 191,313 | 314,940 | 254,474 | 194,987 | | |
| COMMUNICATION | 176,866 | 106,404 | 116,692 | 28,536 | | |
| UTILITIES | 2,461,049 | 2,370,158 | 2,058,618 | 2,637,763 | | |
| REPAIR & MAINTENANCE | 410,152 | 213,894 | 151,280 | 11,917 | | |
| OTHER SERVICES | 144,740 | 300,620 | 581,835 | 501,199 | | |
| OTHER CHARGES | 2,922 | 39,817 | 8,654 | 0 | | |
| OPERATIONAL EXPENSES, TOTAL | 3,387,042 | 3,345,833 | 3,171,553 | 3,374,402 | | |
| CAPITAL EXPENSES | 62,313 | 106,256 | 51,756 | 3,400 | | |
| TOTAL | 4,843,474 | 4,450,866 | 4,356,967 | 5,921,874 | 5,000,000 Approx. | 25,000,000 Approx. |

ANNEX 2.5 PAKISTAN CONTRIBUTION . STAFF ALLOCATION

| NAME OF OFFICE | POSITION/NAME OF INCHARGE | PSO | SSO | SO | AAO | PHOTO G. | STOCK KEEPER | STENO TYPIST | OFFICE ASSTT. | SCI. ASSTT. | TECH. ASSTT. | MALI | LAB. ASSTT. | FIELD MAN | PEON | DRIVER | TOTAL |
|---|---------------------------|-----|--------|----|-----|----------|--------------|--------------|---------------|-------------|--------------|------|-------------|-----------|------|--------|-------|
| Exploration & Collection Lab. | M.S.Bhatti | | (1)* | 1 | | | | | | | | | | 2 | | | 3 |
| Plant Introduction & Seed Health Lab. | Zahoor Ahmad | 1 | | 3 | | | | | | | | 2 | 1 | | | | 7 |
| Seed Preservation Lab. | M.S.Bhatti | | 1* | 2 | | | | | 1 | 1*** | | | 2 | | | | 7 |
| In-Vitro Preservation Research Lab. | Mustafa Sajid | | 1 | 2 | | | | | | | | | 1 | | | | 4 |
| Germlasm Evaluation Lab. | Shahid Hasood | | 3(1)** | | | | | | 1 | | | | 2 | 5 | | | 11 |
| Data Management Lab. | Abdul Qayyum | | 1 | 1 | | | | | | | | | 1 | | | | 3 |
| Administration Section | Rashid Ahmad (Director) | 1 | | | 1 | | 1 | 1 | 1 | | (1)*** | | | 2 | 1 | 3 | 11 |
| Cultivation Facilities | SSO of Evaluation Lab. | | (1)** | | | | | | | 1 | | | | 5 | | | 6 |
| Staff Allocation | | 2 | 6 | 9 | 1 | 0 | 1 | 1 | 1 | 3 | 1 | 2 | 7 | 14 | 1 | 3 | 52 |
| Staff Allocation Planned at the beginning | | 1 | 6 | 8 | 1 | 1 | 1 | 2 | 3 | 11 | 2 | 3 | 5 | 5 | 2 | 3 | 56 |

* PSO ... Principal Scientific Officer * ... One officer (responsible for two areas)
 ** SSO ... Senior Scientific Officer ** ... One officer (responsible for two areas)
 *** ... One officer (responsible for two areas)

ANNEX 3.1: PROGRESS OF PROJECT ACTIVITIES

| ITEM (Attainment 5: 100%, 4: 75%, 3: 50%, 2: 25%, 1: 0%) | CATEGORY OF ATTAINMENT | | | | |
|--|------------------------|------|---|---|---|
| | 5 | 4 | 3 | 2 | 1 |
| 1. EXPLORATION AND COLLECTION | | | | | |
| 1. Investigation on Distribution Pattern of Plant Genetic Diversity in Pakistan | ○ | | | | |
| 2. Determination of Priorities of Collection | ○ | | | | |
| 3. Establishment of Methodologies of Exploration and Collection | ○ | | | | |
| 2. INTRODUCTION AND SEED HEALTH | | | | | |
| 1. Introduction of Plant Genetic Resources from Abroad | ○ | | | | |
| 2. Identification and Indexing of Seedborne Pathogens | ○--- | ---○ | | | |
| 3. Effects of Contamination by Pathogens on Seed Longevity | ○--- | ---○ | | | |
| 4. Influence of Propagation on Incidence of Seedborne Pathogens in Germplasm Coll. | ○--- | ---○ | | | |
| 3. SEED AND IN-VITRO PRESERVATION | | | | | |
| 1. Seed Preservation | | | | | |
| a) Improvement of Seed Storage Procedures | ○ | | | | |
| b) Study for Preservation of Recalcitrant Seeds | ○--- | ---○ | | | |
| c) Assessment of Seed Longevity in the Genebank | ○ | | | | |
| 2. In-vitro and Cryo-Preservation | | | | | |
| a) Establishment of Long-term In-vitro Germplasm Preservation | ○ | | | | |
| b) Study of Long-term Cryo-Preservation of Germplasm | | ○ | | | |
| 4. GERmplasm MULTIPLICATION AND REJUVENATION | | | | | |
| 1. Standardization of Multiplication Techniques of Cross Pollinating Crop Plants | ○ | | | | |
| 2. Multiplication of Germplasm with Decreased Viability and Quantity | ○ | | | | |
| 5. GERmplasm EVALUATION | | | | | |
| 1. Preliminary Evaluation | ○ | | | | |
| 2. Detailed Evaluation of Crop Germplasm | | ○ | | | |
| 3. Biochemical Evaluation | ○ | | | | |
| 6. DATA MANAGEMENT | | | | | |
| 1. Establishment of Database System for Documentation of Genetic Res. Information | ○--- | ---○ | | | |
| 2. Computerization of Information on Stored Germplasm | ○ | | | | |
| 3. Publication of Germplasm Catalogues | ○ | | | | |
| 7. GENEBANK MANAGEMENT | | | | | |
| 1. Strategy for Operation of Genebank Activities and Research | | ○ | | | |
| 2. Exchange of Genetic Resources Information with Domestic Research Institute | | ○ | | | |

ANNEX 3.2: Activities and Achievements of the Project

| Item | Objectives | Brief description of work | Present achievement | Expected achievement by the end of the Project |
|--|---|---|--|---|
| 1. EXPLORATION AND COLLECTION 1) Investigation of plant genetic diversity pattern in Pakistan | To assess the magnitude of genetic diversity and prepare distribution maps. | To make distribution maps of Plant Genetic Resources(PGR) of various plant species found in Pakistan based on passport data. | Distribution maps of plant genetic resources (PGR) of some major crops in Pakistan were drawn based on passport data. | Distribution maps of PGR for all other remaining major crop species collected will be produced. |
| 2) Determination of collection priorities | To determine the crop priorities for collection. | To assess the priority of species and regions to be explored depending on the rate of genetic erosion and importance of crops in the country. | The priority of crop species and regions to be explored has been assessed based on the rate of genetic erosion and importance of crops in the country. | Crop Advisory Committee's recommendations will be followed |
| 3) Establishment of methodologies for exploration and collection | To standardize efficient collecting methods. | To establish systematic methods of genetic resources exploration and collection such as methods of recording the collection sites, description of species and appropriate handling procedures for collected material and processing of passport data. | Systematic methods were established and standardized for PGR collection procedures, recording data at the collection sites, description items, appropriate handling of seeds collected and processing of passport data. A total of 1,946 accessions were collected during 5 year project period. | Establishment of seed collecting methods will be attained on other major / minor crops. |

| Item | Objectives | Brief description of work | Present achievement | Expected achievement by the end of the Project |
|--|---|---|---|---|
| <p>2. INTRODUCTION AND SEED HEALTH</p> <p>1) Introduction of plant genetic resources from abroad</p> | <p>To acquire high priority exotic germplasm.</p> | <p>To promote exchange of plant germplasm useful (but not available within the country) from abroad, including Japan.</p> | <p>A total of 3,281 accessions including rice, wheat, barley, lentil, chickpea, mungbean, vegetables, fruit trees, pasture and medicinal plant were introduced from Japan, USA, Australia, Egypt, ICARDA, Brazil, and North Korea.</p> | <p>Introduced PGR will be evaluated and stored in genebank after inspection of pathogens.</p> |
| <p>2) Identification and indexing of seed-borne pathogens</p> | <p>To identify and index major seedborne pathogens in crop germplasm.</p> | <p>To identify and index pathogen contamination of plant germplasm using morphological and biochemical approaches.</p> | <p>Contamination by bacteria was observed for bacteria and fungi on rice and on sorghum. In both crops, contamination by various pathogens was different in different regions. Detection and identification of pathogenic viruses was also performed on various leguminous crops by ELISA and contamination by various seedborne viruses were clarified. The pathogenic virus (PSbMIV) which does not exist in Pakistan was detected.</p> | <p>Status of contamination of pathogens in rice and sorghum seed will be clarified and monoclonal antibody method for detection of virus contamination in leguminous seeds will be available for specified viruses.</p> |
| <p>3) Effect of contamination by pathogens on seed longevity</p> | <p>To determine seed viability losses due to seed infestation.</p> | <p>To investigate the effect of selected seedborne pathogens on the longevity of seeds stored in the genebank.</p> | <p>Experiments started to compare germinability in clean and contaminated seeds of cowpea and chickpea by BICMV and Ascochyta blight based on 10 years. The results after 4 years showed higher germination rate in clean seeds.</p> | <p>Further remarkable result will be obtained on the effects of pathogen contamination.</p> |

| Item | Objectives | Brief description of work | Present achievement | Expected achievement by the end of the Project |
|---|---|--|---|---|
| 4) Influence of propagation on incidence of seed-borne pathogens | To determine appropriate practices to minimize seedborne contamination. | To propagate contaminated germplasm collections of specific crops in the field and green house with appropriate protective measures and to study the effect of propagation conditions on the incidence of seed contamination after multiplication. | Infection mechanism of pathogens of healthy seedlings from contaminated seed have been clarified for chickpea blight. Protection methods for <i>Ascochyta</i> were established and an explanation booklet was published. | Useful evidences will be obtained on the use of antagonistic bacteria to decrease <i>Ascochyta</i> blight. |
| 3. SEED AND IN-VITRO PRESERVATION 1) Seed preservation (a) Improvement of seed storage procedures | To determine the optimum conditions for seed storage. | To determine the optimum seed storage conditions of selected plant species and to improve the storage procedures. | Many crop species of orthodox seeds were investigated to find the optimum seed storage condition. | Improvement of the seed storage system will be attained for orthodox seeds. |
| (b) Study of preservation of recalcitrant seeds | To find out optimum conditions to prolong storage life of recalcitrant seeds. | To preserve fruit seeds under various temperatures and seed moisture conditions and to observe germinability to find out optimum storage conditions. | Seed preservation experiment have been started on the seeds of jaman fruit and mango. Preservation conditions continue. Seed germinability in apple, pea and grape was determine for 2 years and in citrus for 1 year. | Preserving experiment will continue and some useful data will be generated. Remarks: Germination rate should be observed continuously in future. |
| (c) Assessment of seed longevity in the genebank | To determine the seed longevity under present storage conditions. | To monitor the viability and longevity of seeds transferred from the old facilities and newly collected germplasm, and to determine proper storage conditions. | Seed longevity and germination rate was observed on the germplasm stored in the old storage facilities (newly collected and introduced). To determine the suitable conditions for seed storage, seed longevity was estimated on the selected germplasm. | Anticipated purpose will be accomplished. Remarks: Seed longevity monitoring should continue. |

| Item | Objectives | Brief description of work | Present achievement | Expected achievement by the end of the Project |
|---|---|--|---|---|
| 2) IN-VITRO AND CRYO-PRESERVATION a) Establishment of long-term in-vitro germplasm preservation | To develop techniques for in-vitro preservation of vegetatively propagated crops. | To investigate the in-vitro preservation techniques of vegetatively propagated plants such as sweet potato and fruit tree. | In-vitro preserving systems were established for sugarcane, sweet potato, apricot and citrus. | In-vitro preservation techniques will be established for other crops. |
| (b) Study of long-term cryo-preservation of germplasm | To develop the methodology for cryo-preservation. | To investigate germplasm cryo-preservation techniques | Cryo-preservation has started using young buds of sweet potato. | Transfer of cryo-preservation techniques for selected crop species will be accomplished. |
| 4. GERmplasm MULTIPLICATION AND REJUVENATION 1) Standardization of multiplication techniques for cross pollinating crop plants | To find appropriate methods for seed multiplication of cross pollinated crop species. | To investigate the seed multiplication techniques for cross pollinated crops to maximize genetic integrity of accessions. | Seed multiplication for germplasm of many gramineous crops has been carried out. | Multiplication techniques for cross pollinated crops will be established for cross pollinated crops and seed multiplication will be accomplished. |
| 2) Multiplication of germplasm with decreased viability and quantity | To multiply and rejuvenate crop germplasm. | To investigate methods for multiplying germplasm with decreased viability or which is difficult to multiply. | Seeds of 10,398 accessions were multiplied during 5 years and preserved in the genebank. | Seed multiplication of PGR newly introduced and collected will be completed and seed multiplication of accessions will be accomplished. |

| Item | Objectives | Brief description of work | Present achievement | Expected achievement by the end of the Project |
|--|---|--|---|---|
| 5. GERMPLASM EVALUATION 1) Preliminary evaluation | To characterize germplasm for agronomorphological traits. | To determine the characters to be evaluated for agronomorphological traits with reference to IPRGI descriptors and national needs. To carry out preliminary evaluation. | Primary evaluation was carried out on approximately 8132 accessions of cereals, grain legumes and graminaceous pasture crops for which evaluation characters were determined. | The evaluation of primary characters will be accomplished on accessions available in the genebank. |
| 2) Detailed evaluation of crop germplasm | To screen germplasm for biotic and abiotic stresses. | To determine the technology for evaluating resistance to drought, salinity, diseases and pests. | Some rice germplasm was evaluated for salinity tolerance. Resistance to pathogenic viruses is being evaluated for various leguminous crops and identified the resistant accessions. Genetic relations of resistant character was analyzed on BICMV of cowpea. | Evaluation for salinity tolerance in rice and resistance to viruses in legumes will be well advanced, in collaboration with plant physiologist for abiotic stress, like is being done in case of abiotic. |
| 3) Biochemical evaluation | To identify and classify genetic diversity based on biochemical analysis. | To perform biochemical evaluation using techniques such as electrophoretic analysis of enzymes, proteins and DNA analysis. | Techniques to analyze the polymorphism in several isozyme and proteins by gel electrophoresis were established. PCR techniques were also transferred. At present, survey of genetic diversity is being performed on specified crops such as lentil and wheat. Techniques for 2-dimensional gel electrophoresis of proteins have also been transferred. | Analyses of genetic diversity by protein polymorphisms will be accomplished in some major crops. |

| Item | Objectives | Brief description of work | Present achievement | Expected achievement by the end of the Project |
|---|--|---|--|--|
| <p>6. DATA MANAGEMENT</p> <p>1) Establishment of a database system for documentation of genetic resources</p> | <p>To establish an efficient genetic resources.</p> | <p>To establish a germplasm database including on passport data, storage data and evaluation data.</p> | <p>Three databases for passport data, seed storage and evaluation were improved so that they could be connected. The LAN system was also constructed inside the institute and enable E-mail to be used.</p> | <p>For access to the host computer from each laboratory, security system will be supplied and LAN system will be improved.</p> |
| <p>2) Computerization of information on stored germplasm</p> | <p>To computerize passport and evaluation data for more efficient use.</p> | <p>To input information on stored germplasm such as passport and evaluation data in the computer and to publish such information.</p> | <p>Inputting passport data has proceeded and the PCR data have been almost completed. By unifying passport and storage database, errors were eliminated. A catalogue with a total of 15,495 accessions was published in 1997 based on this database.</p> | <p>Inputting of new data obtained through collections and introduction will continue.</p> |
| <p>3) Publication of germplasm catalogues</p> | <p>To promote the utilization of stored germplasm.</p> | <p>To publish germplasm catalogues.</p> | <p>List of whole PCR, catalogues of wheat, barley, rice and chickpea were published. Further, their revised editions were also published. For the publication of catalogues of other crop species, evaluation data were entered into database.</p> | <p>Publication of the 1997 annual report will be done.</p> |

| Item | Objectives | Brief description of work | Present achievement | Expected achievement by the end of the Project |
|---|---|--|--|--|
| <p>7. GENE BANK MANAGEMENT</p> <p>1) Strategy for operation of genebank activities and research</p> | <p>To establish efficient genebank operation.</p> | <p>To set priorities for genebank operations and research and to strengthen them through coordination.</p> | <p>Coordination among the sections of seed preservation, evaluation, multiplication and data management has progressed.</p> | <p>Coordination among the all sections in PGR1 will be attained.</p> |
| <p>2) Exchange of genetic resources information with domestic research institute</p> | <p>To share genetic resources information with domestic institutes.</p> | <p>To promote the linkage PGR1 and other domestic research institutions working on plant genetic resources by organizing workshops/seminars.</p> | <p>Coordination and linkage with other domestic research institutions was promoted by organizing workshops, seminars, technical training courses and advisory committee meetings. Use of PGR has increased in research institutes.</p> | <p>Coordination with domestic institutions will be initiated for seed multiplication and evaluation of PGR. Remarks: Communication with other institutes will be attained by the establishment of a National Genebank system.</p> |

Annex. 4 Project Impact

| Technical | Institutional | Economic | Socio-cultural | Environmental | Others |
|--|--|--|--|--|--|
| <p>As a result of the Project, various new technologies related to PGR have been established. These new technologies are being applied to various research fields to promote activity in the agricultural sciences. (Researchers and Institutions)</p> <p>Research technologies have also spread to local scientists and students of various institutions and universities through the Project. (Local Institutions)</p> <p>The Project has enabled the PGR to put in place in-country quarantine procedures for research materials.</p> | <p>Technical cooperation for evaluation of PGRs and multiplication of seeds, has started among local institutions. (Local Institutions)</p> <p>Enhanced interaction with international and foreign research institutes has occurred as a result from this Project. (International)</p> | <p>PGRs collected through the Project are being used in various crop breeding programs to develop new varieties.</p> <p>Some new food and animal feed resources, such as rice bean, have been introduced from abroad and adopted by farmers in Pakistan.</p> | <p>The awareness of genetic resources conservation among farming communities has been encouraged including preservation at communal level, especially in northern areas.</p> | <p>By the collection of local land races, precious PGRs of major crops have been preserved at PGR.</p> <p>Therefore, if improved varieties spread minimal danger of genetic erosion in Pakistan will occur since land races are already in the genebank.</p> | <p>The collection and conservation of genetic resources will be useful for increased food production sustainable agriculture and human welfare in the future. (Macro)</p> <p>Most of the PGR have been duplicated in other countries (National & International)</p> <p>Human resources development from inputs of Japanese experts and training C/Ps in Japan has enable PGR to take a leadership role in PGR nationally and regionally.</p> |

2 供与機材リスト（プロジェクト方式技術協力分）

（単位：円）

| 年度 | 購入方法 | 番号 | 機材名 | 数量 | 単価 | 価格 | 分野 | 備考 |
|-------|------|----|--------------|----|------------|------------|-----------|------|
| 平成5年度 | 本邦購送 | 1 | 位相差顕微鏡 | 1 | 991,930 | 991,930 | インビトロ | |
| | | 2 | 電気泳動ゲル乾燥機 | 1 | 135,900 | 135,900 | 評価 | |
| | | 3 | 同上 真空ポンプ | 1 | 395,500 | 395,500 | 評価 | |
| | | 4 | 微量遠心器 | 2 | 1,551,000 | 3,102,000 | 評価、病理 | |
| | | 5 | 蛋白質用電気泳動装置 | 3 | 91,467 | 274,400 | 評価 | |
| | | 6 | 核酸用電気泳動装置 | 1 | 215,500 | 215,500 | 評価 | |
| | | 7 | ELISAプレート | 2 | 39,000 | 78,000 | 病理 | |
| | | 8 | ドライオーブン | 1 | 410,000 | 410,000 | 保存 | |
| | | 9 | 電気恒温器 | 2 | 1,122,000 | 2,244,000 | 保存 | |
| | | 10 | クリーンベンチ | 1 | 1,212,800 | 1,212,800 | 保存 | |
| | | 11 | 超純精製造装置 | 1 | 648,000 | 648,000 | インビトロ | |
| | | 12 | 電気滅菌器 | 2 | 90,500 | 181,000 | インビトロ | |
| | | 13 | ミキサー | 3 | 51,000 | 153,000 | 評価 | |
| | | 14 | 血球計算盤 | 5 | 26,400 | 132,000 | インビトロ | |
| | | 15 | 立体顕微鏡 | 2 | 339,000 | 660,000 | インビトロ | |
| | | 16 | 種子水分計 | 3 | 150,000 | 450,000 | ジーンバンク | |
| | | 17 | 軟X線装置 | 1 | 3,198,000 | 3,198,000 | 暗室 | |
| | | 18 | 発芽試験槽 | 1 | 443,000 | 443,000 | 保存 | |
| | | 19 | その他 | | | | 5,173,824 | |
| | | | 輸送費他 | | | 1,028,857 | | |
| 平成5年度 | 現地調達 | 1 | 複写機 | 1 | 572,794 | 572,794 | JICAチーム | |
| | | 2 | 冷蔵庫 | 2 | 83,771 | 167,542 | JICAチーム | |
| | | 3 | 車両： ジープとパーツ | 1 | 3,934,000 | 3,934,000 | JICAチーム | |
| | | 4 | 車両： ジープ | 1 | 3,200,000 | 3,200,000 | JICAチーム | |
| | | 5 | 車両： 小型ジープ | 1 | 2,857,175 | 2,857,175 | 遺伝資源研究所 | |
| | | 6 | 英文ワープロ | 1 | 154,680 | 154,680 | JICAチーム | |
| | | 合計 | | | | 32,013,902 | | |
| 平成6年度 | 本邦購送 | 1 | プレハブ乾燥室 | 1 | 10,600,000 | 10,600,000 | 乾燥室 | 工事済み |
| | | 2 | 缶びん真空シーラー | 1 | 3,778,000 | 3,778,000 | 保存 | |
| | | 3 | 経緯度測定装置 | 1 | 174,000 | 174,000 | 評価 | |
| | | 4 | 発芽試験槽 | 1 | 883,800 | 883,800 | 保存 | |
| | | 5 | 種子水分計 | 2 | 595,000 | 1,190,000 | 保存 | |
| | | 6 | 上皿電子天秤 | 2 | 414,500 | 829,000 | 評価、インビトロ | |
| | | 7 | 微量遠心機 | 1 | 1,560,610 | 1,560,610 | 病理 | |
| | | 8 | 超低温槽 | 1 | 1,203,500 | 1,203,500 | インビトロ | |
| | | 9 | 光度計 | 1 | 589,710 | 589,710 | インビトロ | |
| | | 10 | ミキサー | 3 | 50,000 | 150,000 | 評価 | |
| | | 11 | マグネティック・ミキサー | 2 | 39,600 | 79,200 | 評価、インビトロ | |
| | | 12 | 電気泳動装置 | 1 | 314,080 | 314,080 | 評価 | |
| | | 13 | 電気泳動装置 | 1 | 129,000 | 129,000 | 評価 | |
| | | 14 | 電気泳動装置 | 2 | 36,000 | 72,000 | 評価 | |
| | | 15 | ポリエチレンシーラー | 2 | 79,500 | 159,000 | ジーンバンク | |

| 年度 | 購入方法 | 番号 | 機 材 名 | 数量 | 単 価 | 価 格 | 分 野 | 備考 | |
|-------|-------|------|----------------|----------------|-----------|-----------|------------|----------|--|
| 平成6年度 | 本邦購送 | 16 | 薬用ショーケース | 1 | 343,000 | 343,000 | 病理 | | |
| | | 17 | 紫外線イルミネーター | 1 | 929,100 | 929,100 | ジーンバンク | | |
| | | 18 | 照射付拡大鏡 | 1 | 119,000 | 119,000 | インビトロ | | |
| | | 19 | ホットプレートミキサー | 1 | 117,000 | 117,000 | インビトロ | | |
| | | 20 | オートクレイブ | 1 | 689,700 | 689,700 | 病理 | | |
| | | 21 | ドライブロック | 1 | 14,700 | 14,700 | 病理 | | |
| | | 22 | ストラクター | 3 | 49,000 | 147,000 | 病理、インビトロ | | |
| | | 23 | 簡易型卓上遠心機 | 2 | 38,000 | 76,000 | 評価、病理 | | |
| | | 24 | ダブルシェーカー | 2 | 201,000 | 402,000 | 評価 | | |
| | | 25 | 遠心エバポレーター | 1 | 702,900 | 702,900 | 病理 | | |
| | | 26 | クーリングトラップ | 1 | 442,000 | 442,000 | 病理 | | |
| | | 27 | 真空プロットングシステム | 1 | 297,900 | 297,900 | 病理 | | |
| | | 28 | 送風循環乾燥機 | 1 | 247,000 | 247,000 | 評価 | | |
| | | 29 | 実体顕微鏡 | 1 | 520,000 | 520,000 | 評価 | | |
| | | 30 | その他 | | | 2,604,800 | | | |
| | | | | 輸送費他 | | | 1,392,431 | | |
| | | 現地調達 | 1 | 温室用網戸 | 188 | | 780,224 | 温室 | |
| | | | 2 | 温室内精密ネットフレーム | 2 | | 140,709 | 温室 | |
| | | | 3 | ウイルス血清 | 17 | | 135,300 | 病理 | |
| | | | 4 | 抗体リエージェント | 1 | | 4,400 | 病理 | |
| | | | 5 | PCR反応装置 | 1 | 1,115,300 | 1,115,300 | 評価 | |
| | | | 6 | スパチュラ、秤量皿 | 11 | | 159,300 | 評価 | |
| | | | 7 | 薬 品 | 80 | | 1,308,200 | 評価、病理、保存 | |
| | | | 8 | 薬 品 | 14 | | 150,195 | 評価、病理、保存 | |
| | | | 9 | CD-ROMドライブ | 1 | 726,000 | 726,000 | 情報管理 | |
| | | | 合 計 | | | | 35,267,059 | | |
| | 平成7年度 | 本邦購送 | 1 | 発芽試験機 | 1 | 922,100 | 922,100 | 保存 | |
| | | | 2 | 伝導度計 | 1 | 158,000 | 158,000 | 保存 | |
| | | | 3 | 真空包装機 | 1 | 140,100 | 140,100 | ジーンバンク | |
| | | | 4 | CO2インキュベーター無菌台 | 1 | 4,007,600 | 4,007,600 | 病理 | |
| 5 | | | 高圧蒸気滅菌機 | 1 | 4,517,800 | 4,517,800 | 病理 | | |
| 6 | | | 分光光度計 | 1 | 1,505,200 | 1,505,200 | 評価 | | |
| 7 | | | 定温器 | 1 | 330,000 | 330,000 | 中央機器室 | | |
| 8 | | | 超低温冷蔵庫 | 1 | 890,600 | 890,600 | インビトロ | | |
| 9 | | | マイクローム | 1 | 1,220,000 | 1,220,000 | 病理 | | |
| 10 | | | 遠心乾燥機 | 1 | 891,300 | 891,300 | 評価 | | |
| 11 | | | ハイブリダイゼーション定温器 | 1 | 462,400 | 462,400 | 病理 | | |
| 12 | | | 兼用定温槽 | 1 | 200,000 | 200,000 | 評価 | | |
| 13 | | | 液体窒素容器 | 1 | 200,000 | 200,000 | インビトロ | | |
| 14 | | | 蛍光測定器 | 1 | 722,000 | 722,000 | 評価 | | |
| 15 | | | 電気泳動電源装置 | 1 | 128,000 | 128,000 | 評価 | | |
| 16 | | | 電気泳動装置 | 1 | 193,000 | 193,000 | 評価 | | |
| 17 | | | 落射蛍光顕微鏡 | 1 | 1,945,000 | 1,945,000 | インビトロ | | |
| 18 | | | 振盪培養器 | 1 | 814,000 | 814,000 | 評価 | | |
| 19 | | | 滅菌濾過装置 | 2 | 560,000 | 1,120,000 | インビトロ | | |
| 20 | | | ウォーターバス・シェーカー | 1 | 299,500 | 299,500 | 評価 | | |

| 年度 | 購入方法 | 番号 | 機材名 | 数量 | 単価 | 価格 | 分野 | 備考 | |
|-------|------|----|-----------------|-----|-----------|------------|---------|----|--|
| 平成7年度 | 本邦購入 | 21 | 紫外線照射装置 | 1 | 466,000 | 466,000 | 評価 | | |
| | | 22 | クロマト自動分析装置 | 1 | 1,754,300 | 1,754,300 | 評価 | | |
| | | 23 | 高压滅菌器 | 1 | 601,800 | 601,800 | インビトロ | | |
| | | 24 | ホモジナイザー | 1 | 310,000 | 310,000 | 病理 | | |
| | | 25 | ループ滅菌器 | 2 | 100,000 | 200,000 | インビトロ | | |
| | | 26 | 蛋白質分析装置 | 1 | 3,307,536 | 3,307,536 | 評価 | | |
| | | 27 | 細胞融合装置 | 1 | 1,060,000 | 1,060,000 | インビトロ | | |
| | | 28 | その他 | | | 1,975,286 | | | |
| | | | 輸送費他 | | | 1,449,082 | | | |
| | 現地調達 | 1 | サーバー | 1 | 567,600 | 567,600 | 情報管理 | | |
| | | 2 | パーソナル・コンピューター | 4 | 235,440 | 941,760 | 情報管理、他3 | | |
| | | 3 | ラインプリンター | 1 | 1,170,000 | 1,170,000 | 情報管理 | | |
| | | 4 | ドットマトリック・プリンター | 2 | 82,080 | 164,160 | ゼンパン、評価 | | |
| | | 5 | 内部取り付けテープバックアップ | 1 | 90,000 | 90,000 | 情報管理 | | |
| | | 6 | マグネットオペティカルドライブ | 1 | 210,000 | 210,000 | 情報管理 | | |
| | | 7 | デジタルカメラ | 1 | 81,000 | 81,000 | 情報管理 | | |
| | | 8 | データショー | 1 | 285,000 | 285,000 | 情報管理 | | |
| | | 9 | ラップトップ・パソコン | 1 | 336,000 | 336,000 | 情報管理 | | |
| | | 10 | カラースキャナー | 1 | 225,000 | 225,000 | 情報管理 | | |
| | | 11 | パーソナルコンピューター17 | 1 | 579,000 | 579,000 | 地図作成 | | |
| | | 12 | ハードディスク | 1 | 195,000 | 195,000 | 地図作成 | | |
| | | 13 | デジタイザー | 1 | 654,000 | 654,000 | 地図作成 | | |
| | | 14 | プロッター | 1 | 480,000 | 480,000 | 地図作成 | | |
| | | 15 | インクジェット・プリンター | 1 | 99,000 | 99,000 | 地図作成 | | |
| | | 16 | DATドライブ | 1 | 240,000 | 240,000 | 地図作成 | | |
| | | 17 | 複写機 | 1 | 858,600 | 858,600 | 地図作成 | | |
| | | 18 | その他 | | | 3,542,889 | | | |
| | | 合計 | | | | 42,509,604 | | | |
| 平成8年度 | 本邦購送 | 1 | pHメーター | 1 | 260,090 | 260,090 | インビトロ | | |
| | | 2 | 電気泳動装置 | 1 | 254,600 | 254,600 | 評価 | | |
| | | 3 | 電気泳動装置 | 1 | 71,800 | 71,800 | 評価 | | |
| | | 4 | 冷却水循環装置 | 1 | 349,500 | 349,500 | 評価 | | |
| | | 5 | 真空デシケーター | 1 | 61,800 | 61,800 | 評価 | | |
| | | 6 | 種子貯蔵用缶(大) | 220 | 1,610 | 354,200 | 保存 | | |
| | | 7 | 種子貯蔵用缶(中) | 563 | 610 | 343,430 | 保存 | | |
| | | 8 | ホットスターラー | 1 | 61,800 | 61,800 | 評価 | | |
| | | 9 | 真空ポンプ | 1 | 261,900 | 261,900 | 評価 | | |
| | | 10 | pHメーター | 1 | 274,940 | 274,940 | 評価 | | |
| | | 11 | ハイブリッド用オープン | 1 | 540,240 | 540,240 | 評価 | | |
| | | 12 | マイクロプレート・リーダー | 1 | 708,360 | 708,360 | 病理 | | |
| | | 13 | マグネチック・スターラー | 2 | 50,500 | 101,000 | 病理 | | |
| | | 14 | 蛋白質プロテイング装置 | 1 | 927,560 | 927,560 | 病理 | | |
| | | 15 | ホットスターラー | 1 | 57,740 | 57,740 | インビトロ | | |
| | | 16 | マグネチック・スターラー | 2 | 11,550 | 23,100 | インビトロ | | |
| | | 17 | 恒温水槽 | 1 | 70,500 | 70,500 | 評価 | | |
| | | 18 | ミキサー | 1 | 72,700 | 72,700 | 評価 | | |

| 年度 | 購入方法 | 番号 | 機材名 | 数量 | 単価 | 価格 | 分野 | 備考 |
|-------|------|-------------|----------------|--------|------------|-------------|----------|----|
| 平成8年度 | 本邦購送 | 19 | シェイカー | 1 | 105,450 | 105,450 | 評価 | |
| | | 20 | 電気泳動装置 | 5 | 143,100 | 715,500 | 評価 | |
| | | 21 | PCR装置 | 1 | 956,760 | 956,760 | 病理 | |
| | | 22 | 刈り払い機 | 4 | 66,960 | 267,840 | 評価 | |
| | | 23 | 最高最低寒暖計 | 4 | 5,670 | 22,680 | ジープック | |
| | | 24 | アスピレーター | 5 | 3,262 | 16,310 | 評価 | |
| | | 25 | ニトロセルローズ膜 | 5 | 14,200 | 71,000 | 病理 | |
| | | 26 | pHメーター用電極 | 3 | 23,700 | 71,100 | インビトロ、他2 | |
| | | 27 | 三法バーナー | 1 | 27,800 | 27,800 | 病理 | |
| | | 28 | 冷蔵庫 | 1 | 839,500 | 839,500 | ジープック | |
| | | 29 | バインダー | 1 | 444,400 | 444,400 | 評価 | |
| | | 30 | 脱穀機 | 1 | 46,400 | 46,400 | 評価 | |
| | | 31 | その他 | | | 2,144,100 | | |
| | | | | | | 1,528,998 | | |
| | 現地調達 | 1 | 試験管立て | 10 | 1,500 | 15,550 | インビトロ | |
| | | 2 | 薬品棚 | 6 | 37,200 | 223,200 | インビトロ、他2 | |
| | | 合計 | | | | 12,217,698 | | |
| 平成9年度 | 本邦購送 | 1 | メンテナンス用工具キット | 1 | 75,000 | 75,000 | 保守 | |
| | | 2 | ラボ機器用工具キット | 1 | 20,000 | 20,000 | 評価 | |
| | | 3 | ラボ機器用スペアパーツ | 10 | | 3,499,600 | インビトロ、他2 | |
| | | 4 | 共通スペアパーツ | 18 | | 488,900 | 保守 | |
| | | 5 | 薬品 | 3 | | 30,300 | 病理 | |
| | | | | | | | 617,070 | |
| | 現地調達 | 1 | バックアップ用発電機 | 1 | 13,000,000 | 13,000,000 | 発電機室 | |
| | | 2 | 安定電源(UPS) | 1 | 78,000 | 78,000 | 情報管理 | |
| | | 3 | ドットマトリック・プリンター | 1 | 96,000 | 96,000 | インビトロ | |
| | | 4 | カラーモニター、14" | 1 | 45,000 | 45,000 | 情報管理 | |
| 5 | | デジタルカメラ用付属品 | 6 | 17,100 | 17,100 | 情報管理 | | |
| | | 合計 | | | | 17,966,970 | | |
| | | 総計 | | | | 139,975,233 | | |

3 無償資金協力で導入した機材の状況

| 所在 | 機器名 | 数量 | 単価 | 合計 | 利用状況 | 補修 | 備考 |
|-------|-------------------|----|------------|------------|------|----|--------|
| 種子病理 | ステレオ双眼顕微鏡 | 3 | 1,913,000 | 5,739,000 | A | A | |
| | 硝子器具自動洗浄機 | 1 | 1,794,400 | 1,794,400 | C | A | |
| | 総合顕微鏡 | 1 | 7,804,200 | 7,804,200 | A | A | |
| | グローブ・チャンバー | 1 | 22,049,900 | 22,049,900 | A | A | |
| | クリーンベンチ | 1 | 1,911,500 | 1,911,500 | A | A | |
| | 分光光度計 | 1 | 2,007,300 | 2,007,300 | A | A | |
| | ELISAスキャン装置 | 1 | 6,216,600 | 6,216,600 | A | B | 本部修理実施 |
| | 凍結乾燥機 | 1 | 5,254,200 | 5,254,200 | B | A | |
| | 簡易土壌滅菌器 | 1 | 4,133,800 | 4,133,800 | A | A | |
| 種子保存 | 大型発芽試験器 | 1 | 2,052,900 | 2,052,900 | A | A | |
| | ステレオ双眼顕微鏡 | 1 | 1,216,600 | 1,216,600 | A | A | |
| | 種子計数装置 (アスピレーター付) | 1 | 3,455,000 | 3,455,000 | A | A | |
| | 硝子器具自動洗浄装置 | 1 | 1,794,400 | 1,794,400 | C | A | |
| 文化 | ステレオ双眼顕微鏡 | 1 | 2,335,800 | 2,335,800 | A | A | |
| | プログラム・フリーザー | 1 | 5,395,400 | 5,395,400 | A | A | |
| | ディープ・フリーザー | 1 | 2,301,900 | 2,301,900 | A | A | |
| | 硝子器具自動洗浄装置 | 1 | 1,794,400 | 1,794,400 | B | A | |
| 評価 | 葉面積計 | 1 | 1,618,000 | 1,618,000 | A | B | 要修理 |
| | ステレオ双眼顕微鏡 | 1 | 1,216,600 | 1,216,600 | A | A | |
| | 微量粉碎器 | 1 | 1,233,600 | 1,233,600 | B | A | |
| | 油含量分析計 | 1 | 9,099,800 | 9,099,800 | A | A | |
| | 硝子器具自動洗浄装置 | 1 | 1,794,400 | 1,794,400 | C | A | |
| | 燻蒸滅菌箱 | 1 | 6,386,900 | 6,386,900 | B | A | |
| | 廃液処理装置 | 1 | 3,271,000 | 3,271,000 | C | A | |
| ゲージ | ドック計数計 | 1 | 6,394,500 | 6,394,500 | B | A | |
| | 種子計数装置 (アスピレーター付) | 1 | 3,455,000 | 3,455,000 | A | A | |
| | エアカーテン掃除機 | 1 | 1,963,200 | 1,963,200 | A | A | |
| | 種子乾燥機 | 2 | 7,983,600 | 15,967,200 | A | A | |
| 中央機器室 | グローブ・チャンバー | 1 | 25,276,400 | 25,276,400 | A | A | |
| | 遠心器 | 1 | 4,881,400 | 4,881,400 | A | A | |
| | 超遠心機 | 1 | 18,552,300 | 18,552,300 | A | B | 修理実施 |
| 総務 | 複写機 | 1 | 1,540,500 | 1,540,500 | A | A | |
| メンテ室 | 電流計測器 | 1 | 1,353,400 | 1,353,400 | A | A | |

4 専門家派遣およびカウンターパート研修受入実績

<日本側投入実績>

(1) 専門家の派遣実績

1) 長期専門家

| | | |
|-------|---------------|-------------------------|
| 村田 伸夫 | リーダー、ジーンバンク管理 | 1993年 6月18日-1995年10月17日 |
| 蒲生 卓磨 | リーダー、ジーンバンク管理 | 1995年 9月25日-1998年 5月31日 |
| 佐藤 博保 | 種子保存 | 1993年 7月 9日-1998年 5月31日 |
| 三枝 隆夫 | 種子病理 | 1994年 4月 7日-1998年 5月31日 |
| 西川 昭司 | 業務調整 | 1993年 6月11日-1995年 6月10日 |
| 木村 健司 | 業務調整 | 1995年 6月12日-1998年 5月31日 |

2) 短期専門家

| | | |
|--------|--------------|-------------------------|
| 安間 舜 | 評価・記録 | 1993年11月12日-1994年 2月13日 |
| 声沢 正和 | 遺伝資源収集 | 1994年 3月21日-1994年 4月17日 |
| 池谷 裕幸 | 試験管内保存 | 1994年 2月18日-1994年 3月20日 |
| 平成6年度 | | |
| 土師 岳 | 遺伝資源収集 | 1994年 7月14日-1994年 8月 7日 |
| 安間 舜 | 記録様式の標準化 | 1994年11月 4日-1995年 3月 1日 |
| 山守 誠 | 遺伝資源評価 | 1995年 2月10日-1995年 3月 5日 |
| 野津 祐三 | 種子病理 | 1995年 3月20日-1995年 4月16日 |
| 平成7年度 | | |
| 寺井 理治 | 遺伝資源収集 | 1995年 8月 4日-1995年 9月10日 |
| 三宅 政則 | 植物ウイム無毒化技術 | 1995年 8月 4日-1995年 9月10日 |
| 野津 祐三 | 種子病理 | 1995年 8月 4日-1995年 9月10日 |
| 中村 征二 | 機材据え付け | 1995年12月 4日-1995年12月24日 |
| 安間 舜 | 情報ネットワーク | 1996年 2月 2日-1996年 4月 2日 |
| 清田 誠一郎 | 生化学的評価 | 1996年 2月19日-1996年 3月24日 |
| 野口 雄司 | 超遠心機修理 | 1996年 2月26日-1996年 3月 4日 |
| 平成8年度 | | |
| 吉田 久 | 遺伝資源探索収集 | 1996年 5月27日-1996年 6月23日 |
| 木浦 卓治 | コンピュータシステム構築 | 1996年 7月 5日-1996年 8月 1日 |
| 門脇 光一 | 生化学的評価 | 1996年11月18日-1996年12月16日 |
| 竹谷 勝 | データマネジメント | 1997年 2月17日-1997年 3月 9日 |
| 加来 久敏 | 種子細菌病 | 1997年 2月20日-1997年 3月 9日 |
| 木浦 卓治 | 3種データベースの連結 | 1997年 2月17日-1997年 3月 2日 |
| 平成9年度 | | |
| 飯塚 典男 | 種子病理 | 1997年11月10日-1997年12月 7日 |
| 上野 節子 | 生化学評価 | 1997年11月10日-1997年11月28日 |
| 岡 成美 | 超低温保存 | 1998年 1月19日-1998年 2月 8日 |
| 林 唯博 | 情報管理 | 1998年 1月 -1998年 1月 |
| 藤田 雅也 | 詳細評価 | 1998年 2月 -1998年 2月 |

(2) カウンターパートの受入実績

| | | |
|------------------------|----------|-------------------------|
| 平成5年度 | | |
| Dr.Zahoor Ahmad | 集団研修 | 1993年 5月 8日-1993年10月 |
| Dr.Mu. Shahid Masood | 遺伝資源評価 | 1993年 9月13日-1993年12月21日 |
| Mr.Shahzad Naseem | 遺伝資源評価 | 1993年 9月13日-1993年12月21日 |
| 平成6年度 | | |
| Mr.Sadaruddin Siddiqui | 試験管内培養 | 1994年 8月29日-1995年 1月22日 |
| Mr.M. Sadiq Bhatti | ジーンバンク管理 | 1994年 9月 5日-1995年 3月12日 |
| Mr.Muhammad Rashid | 施設管理 | 1994年11月15日-1995年 3月12日 |
| 平成7年度 | | |
| Mr.Muhammad Arif | 集団研修 | 1995年 5月 8日-1995年10月 3日 |
| Mr.Abdul Qayyum | 情報管理 | 1995年11月15日-1995年 4月28日 |
| Mr.Muhammad Munir | ジーンバンク操作 | 1996年 3月25日-1996年 9月22日 |

平成8年度

| | | |
|--------------------|---------|-------------------------|
| Mr.Abdul Ghafoor | 集団研修 | 1996年 5月 6日－1996年11月 1日 |
| Mr.Muhammad Afzal | 生化学的評価 | 1996年 5月20日－1996年11月17日 |
| Dr.Muhammad Sarwar | 雑貯蔵種子保存 | 1996年 5月20日－1996年 9月 8日 |
| Mr.Zahar Riaz | 病原体同定 | 1996年 5月20日－1996年10月20日 |
| Dr.Muhammad Bashir | ウイルス検出法 | 1996年 9月 9日－1996年12月22日 |

平成9年度

| | | |
|-------------------|-------------|-------------------------|
| Dr.Zahoor Ahmad | ジーンバンク管理・運営 | 1997年 6月22日－1997年 6月22日 |
| Mrs.Abida Akhtar | ウイルス－植物の作成 | 1997年 6月 6日－1997年 9月20日 |
| Miss Nayyar Kazmi | データベース設計 | 1998年 2月 - (1998年度実施予定) |

5 日本側ローカルコストおよびパキスタン側運営経費負担実績

日本側ローカルコスト負担実績

(単位：円)

| 予算年度 | 93 | 94 | 95 | 96 | 97 | 98 | 計 |
|---------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| 一般現地業務費 | 6,200,000 | 6,200,000 | 4,800,000 | 5,500,000 | 4,500,000 | 1,000,000 | 28,200,000 |
| 現地セミナー費 | - | 995,000 | 720,000 | 886,000 | - | - | 3,495,000 |
| 特別セミナー費 | - | - | - | - | 3,923,000 | - | 3,923,000 |
| 技術交換費 | - | - | 1,315,000 | - | 709,000 | - | 2,024,000 |
| 応急対策費 | - | - | 2,074,000 | - | - | - | 2,074,000 |
| 計 | 6,200,000 | 7,195,000 | 8,909,000 | 7,280,000 | 9,132,000 | 1,000,000 | 39,716,000 |

パキスタン側運営経費負担実績

(単位：ルピー)

| 予算年度 | 93 | 94 | 95 | 96 | 97 | 計 |
|---------|-----------|-----------|-----------|-----------|-------------|--------------|
| 人件費 | 1,334,119 | 998,777 | 1,130,658 | 2,544,072 | | |
| 交通費 | 191,313 | 314,940 | 254,474 | 194,987 | | |
| 通信費 | 176,866 | 106,404 | 116,692 | 28,536 | | |
| 光熱/消耗品費 | 2,461,049 | 2,370,158 | 2,058,618 | 2,637,763 | | |
| 保全/修理費 | 410,152 | 213,894 | 151,280 | 11,917 | | |
| その他サービス | 144,740 | 300,620 | 581,835 | 501,199 | | |
| その他チャージ | 2,922 | 39,817 | 8,654 | 0 | | |
| 運営費 計 | 3,387,042 | 3,345,833 | 3,171,553 | 3,374,402 | | |
| 機材/備品費 | 62,313 | 106,256 | 51,756 | 3,400 | | |
| 計 | 4,843,474 | 4,450,866 | 4,356,967 | 5,921,874 | 概算5,000,000 | 概算25,000,000 |

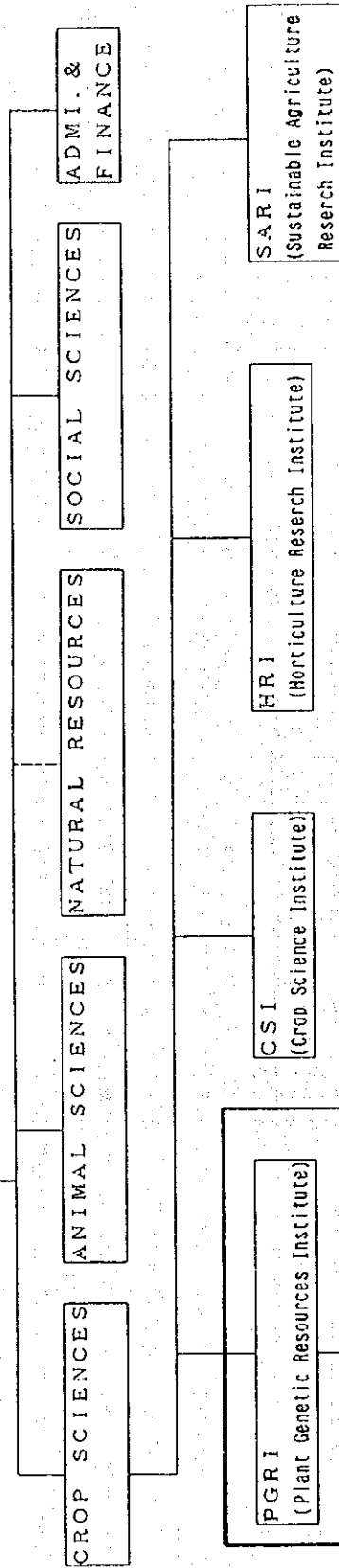
6 プロジェクト組織図

PROJECT ORGANIZATION

MINFAL (Ministry of food, agriculture and livestock)

PARC (Pakistan agricultural research council)

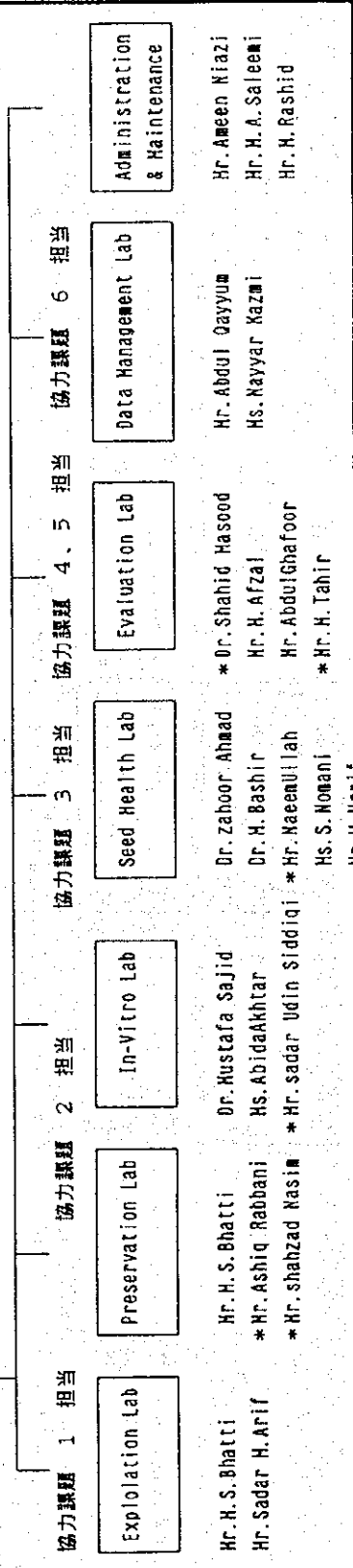
NAIRC (National agricultural research centre)



協力課題 7 担当
DIRECTOR:
Mr. Rashid Anwar

JICA PGRI PROJECT

* 文部省留学あるいは共同研究で
日本に滞在中



PUBLICATIONS

15, January, 1998

Research Papers in Journals

- Ghafoor, A., M. Tahir, M. Zubair and B.A. Malik. 1993. Combining ability in *Vigna mungo* (L. Hepper). Pak. J. Bot. 25(1): 1-6.
- Ghafoor, A., M. Zubair and B.A. Malik. 1993. Selection indices in *Vigna mungo* L. PJAAEVS. 9(1-2): 67-70.
- Afzal, M., M. Kawase, H. Nakayama and K. Okuno. 1994. Variation in electrophoregrams of total seed protein and WX protein in foxtail millet. Breeding Sci. 44 (Suppl. 2): 624.
- Okuno, K., H. Yoshida and M.S. Masood. 1994. Geographical distribution of wild relatives of cultivated wheat and barley in Central Asia and variation in total seed protein by SDS-PAGE. Breeding Sci. 44 (Suppl. 1) : 272.
- Taya, S., N. Nakayama and M. Afzal. 1994. Collaborative exploration for collecting wheat and barley in Pakistan. Plant Exploration. 10: 35-73.
- Afzal, M., M. Kawase, H. Nakayama and K. Okuno. 1995. Variation in electrophoregrams of total seed storage and waxy protein in Foxtail millet. Proc. Third National Symposium on New Crops, New Opportunities, New Technologies, Indiana, USA. : 73-77.
- Ahmad, Z., M. Bashir, K. Nakashima, T. Mitsueda and N. Murata. 1995. Bermuda grass white leaf caused by phytoplasma in Pakistan. Pak. J. Bot. 27(1) : 251-252.
- Bashir, M., Z. Ahmad, S. Riaz and B.A. Malik. 1995. Sources of immunity in cowpea against blackeye mosaic poty virus. Pak. J. Phytopath. 7(2) : 94-97.
- Masood, M.S. 1995. Harvesting crop genetic diversity and its preservation. Proc. National Seminar on the Nature and Rational for the Protection of the Plant Varieties under the UPOV Convention, Nov., 1994. In UPOV Publication No. 742(E) : 97-101.
- Tahir, M., A. Ghafoor, and M. Zubair. 1995. Genetic of seed weight in lentil (*Lens culinaris* Medik). Pak. J. Bot. 27(2) : 435-439.
- Afzal, M., M. Kawase, K. Okuno and R. Anwar. 1996. Variation and geographical distribution of seed storage proteins and waxy proteins in foxtail millet (*Setaria italica*). Proc. National Seminar on "Genetic Resources of Cereal and their Utilization in Pakistan" held on February 8-10, 1994 at Islamabad. Ed. A.A. Jaradat, IPGRI, WANA : 137-149.
- Ahmad, Z. 1996. Restriction fragment length polymorphism (RFLP) analysis of Pseudomonads isolated from rice seed and seedlings. Proc. National Seminar on "Genetic Resources of Cereal and their Utilization in Pakistan" held on February 8-10, 1994 at Islamabad. Ed. A.A. Jaradat, IPGRI, WANA : 159-168.
- Ahmad, Z., T. Gamo and N. Murata. 1996. International patterns assist-Pakistan in

establishing Plant Genetic Resources Institute. Diversity 12(3): 70-71.

Bashir, M. and R.O. Hampton. 1996. Sources of genetic resistance in cowpea (*Vigna unguiculata* (L.) Walp.) to cowpea aphid-borne mosaic potyvirus. Europ. J. Plant Pathol. 102: 411-419.

Bhatti, M.S. and R. Anwar. 1996. Rice genetic diversity in different agroecological regions of Pakistan, its collection and conservation. Proc. National Seminar on "Genetic Resources of Cereal and their Utilization in Pakistan" held on February 8-10, 1994 at Islamabad. Ed. A.A. Jaradat, IPGRI, WANA : 39-55.

Masood, S., K. Okuno and R. Anwar. 1996. Inter- and intra-specific variation in SDS-PAGE electrophoregrams of total seed protein in wheat, barley and their wild relatives. Proc. National Seminar on "Genetic Resources of Cereal and their Utilization in Pakistan" held on February 8-10, 1994 at Islamabad. Ed. A.A. Jaradat, IPGRI, WANA : 125-135.

Masood, S., K. Okuno and R. Anwar. 1996. Varietal classification of rice based on random amplified polymorphic DNA (RAPDs). Proc. National Seminar on "Genetic Resources of Cereal and their Utilization in Pakistan" held on February 8-10, 1994 at Islamabad. Ed. A.A. Jaradat, IPGRI, WANA : 151-157.

Nasim, S. and M.S. Bhatti. 1996. Assessing viability in conserved wheat genetic resources using different physiological and biochemical techniques. Proc. National Seminar on "Genetic Resources of Cereal and their Utilization in Pakistan" held on February 8-10, 1994 at Islamabad. Ed. A.A. Jaradat, IPGRI, WANA : 183-191.

Tahir, M., T. Turchetta, R. Anwar and D. Lafiandra. 1996. Assessment of genetic variability in hexaploid wheat land races of Pakistan based on polymorphism for HMW glutenin subunits. J. Genetic Resources and Crop Evolution. 43 : 211-220.

Masood, M.S. and W.E. Kronstad. 1997. Combining ability analysis over various generation in a diallel cross of bread wheat. Accepted in Pak. J. Agri. Res.

Mitsueda, T., Z. Riaz, M. Bashir and Z. Ahmad. 1997. Mechanism of "seed to seedling infection" by *Ascochyta rabiei* (Pass.) Lab. in chickpea. Accepted in Pak. J. Bot.

Mitsueda, T., Z. Riaz, M. Bashir and Z. Ahmad. 1997. Efficacy of fungicide seed treatment for the control of primary infection of chickpea blight caused by *Ascochyta rabiei*. Submitted to Pak. J. Phytopath.

Oral Presentation

Ahmad, Z., M. Bashir, Z. Riaz and B. A. Malik. 1995. Germplasm evaluation of *Vigna* species for the detection of seed-borne viruses. In National Workshop on "Conservation of Biodiversity for Sustainable Agriculture" held on 12-13 March, 1995 in Islamabad.

Ahmad, Z. 1996. Pakistan National Germplasm System with emphasis on acquisition, evaluation and data management. In International Seminar on "Present Status and Future Prospects of Plant Genetic Resources Conservation and Utilization" held in Sri Lanka on December 9-19, 1996.

- Ahmad, Z. 1996. Country report on medicinal plants of Pakistan. Seminar in ICIMOD, Nepal held on 12-18 May, 1966.
- Ahmad, Z., M. Bashir, T. Mitsueda and M. Hanif. 1997. Evaluation of legume germplasm for seed borne viruses. Abst. 9th SABRAO Congr.(Seoul). 41p., Sept., 1997.
- Ahmad, Z., M. Bashir, T. M. Hanif and Mitsueda . 1997. Some observation on seed health issues, strategies and solution for keeping clean seeds in PGRI genebank. It. Seminar on "Plant Genetic Resources for Food Security in South and West Asia" held in Islamabad on 3- 5 November, 1997.
- Akhtar, A. 1997. In-vitro conservation in citrus and production of virus free cultivars. Int. Seminar on "Plant Genetic Resources for Food Security in South and West Asia" held in Islamabad on 3- 5 November, 1997.
- Anwar, R. 1997. Overview of plant genetic resources in Pakistan. Int. Seminar on "Plant Genetic Resources for Food Security in South and West Asia" held in Islamabad on 3- 5 November, 1997.
- Bashir, M., A. Ghafoor, M. Zubair and B.A. Malik. 1996. Screening of mash (*Vigna mungo* L.) germplasm and advance breeding lines for virus diseases under field conditions. Crop protection conference - 1996. NWFP Agric. Univ., Peshawar. on 20-22 April, 1996.
- Bhatti, M.S. 1996. Effect of seed aging on physiological parameters and DNA polymorphism. In International Seminar on "Sustainable Use of Genetic Resources for Food Security" held on 2-3 October, 1996 in Islamabad.
- Gamo, T., Z. Ahmad, M.S. Bhatti, S. Masood, M. Sarwar, M. Bashir. 1997. Research activities at plant genetic resources institute, Pakistan in collaboration with Japan. Abst. 8th SABRAO Congr.(Seoul). 42p. Sept. , 1997.
- Ghafoor, A., C.A. Rauf and M. Iqbal. 1996. Screening for resistance in mash against yellow mosaic disease. Crop protection conference - 1996. NWFP Agric. Univ., Peshawar. on 20-22 April, 1996.
- Ghafoor, A., M. Afzal and A. Sharif. 1997. *Vigna mungo* genetic resources for sustainable agricultural production. Int. Seminar on "Plant Genetic Resources for Food Security in South and West Asia" held in Islamabad on 3- 5 November, 1997.
- Khalid, S. and S.u. Siddiqui. 1996. Role of positive identification in ethonobotany. Proc. First Training Workshop on "Ethonobotany and its Application to Conservation" held on 16-24, September, 1996 in Islamabad : 181-196.
- Komatsu, S., M. Afzal, T. Gamo, M. Kuroiwa and T. Masuda. 1997. Identification and making of a data-file of proteins separated by two-dimensional electrophoresis from green and etiolated rice leaves. Abst., Ann. Meeting of Jap. Soc. of Agricultural Chem., 1997 in Tokyo, p. 94.
- Siddiqui, S.u. and S. Khalid. 1996. *Alove vera*: An example for medicinal use. Proc. First Training Workshop on "Ethonobotany and its Application to Conservation" held on 16-24, September, 1996 in Islamabad :83-89.

Qayyum, A. and M. Sarwar. 1997. Status of genetic diversity in underutilized plant genetic resources of Pakistan. In "First National Meeting on Underutilized Crops of Pakistan". held on 28-28, 1997 in Islamabad.

Poster presentation

Murata, N., Z. Ahmad, T. Mitsueda and M. Bashir. 1997. Seed health problems in germplasm collection at Pakistan plant genetic resources Institute-strategies and solutions. Abst. 8th SABRAO Congr.(Seoul). 90p., Sept., 1997.

Newsletter

Anwar, R., M.S. Bhatti, M. Afzal and A. Rabbani. 1993. Collecting fibre plant germplasm in Pakistan. Plant Genetic Resources Newsletter. 94: 21-25.

Bhatti, M.S., R. Anwar and H.A. Van Rheenen. 1994. Collection of wild cicer species in Pakistan. International Chickpea Newsletter (ICRISAT, India). 28: 4-5.

Bhatti, M.S., M. Arif and I. Robertson. 1994. Collection of pasture, forage and food legumes in Baluchistan, Pakistan. Genetic Resources Unit, Annual Report 1993, ICARDA, Aleppo, Syria, ICARDA 035/500/June, 1994.

Bhatti, M.S. 1994. JICA technical assistant for PGR collection in Pakistan during 1994. JICA technical assistance activities for genetic resources project. GRP Newsletter. No.21, JICA, Japan.

Van Rheenen, H.A., M.S. Bhatti and K.V.S. Rao. 1994. The sustainable preservation of Biodiversity in self pollinating plant species: sample size and collecting methodology. FAO/IPGRI Plant Genetic Resources Newsletter. 96: 1-4.

Anwar, R., M.S. Bhatti and M. Arif. 1995. Agro-ecological survey for cruciferae vegetables and fruit germplasm in Pakistan. WANA, IPGRI Newsletter, No. 6: 6-7.

Anwar, R. 1997. A secondary center of diversity. WANA, IPGRI Newsletter, No. 15: 6-7.

Okuno, K., M. Katsuda, M. Takeya, Y. Egawa, M. Afzal, M. Nakagawara, M. Kawase, T. Nagamine, H. Nakano, R. Anwar, M.S. Bhatti and Z. Ahmad. 1995. Collaboration of Pakistan and Japan in collecting genetic resources in Pakistan. Plant Genetic Resources Newsletter. No.101: 16-19.

Riaz, Z., T. Mitsueda and Z. Ahmad. 1995. Seed borne fungi of rice collected from Pakistan. Plant Genetic Resources Newsletter. No.103: 39-40.

Anwar, R. and Y. Adham. 1996. A plant genetic resources network (CAN/PGR) in Central Asia. WANA, IPGRI Newsletter. No. 12: 5.

Bhatti, M.S. 1996. JICA collaboration for PGR collection in Pakistan. GRP Newsletter. No. 26: 1.

Tahir, M. 1996. Biochemical evaluation of plant genetic resources. Progress report (October 1993, March 1994) and final report. Plant Genetic Resources Newsletter. No. 105: 48.

Yamamori, M. and M. Afzal. 1996. Crop germplasm evaluation at the Plant Genetic

Resources Institute, Pakistan. GRP Newsletter. No.27: 1.

Anwar, R. 1997. A secondary center of diversity. WANA, IPGRI Newsletter, No. 15: 6.

General Articles

Haqqani, A.M., B.A. Malik, A. Ghafoor, A. Tahir and M. Zubair. 1993. Sustainable development and preservation of genetic diversity in food legumes. Progressive Farming. 13(5): 19-26.

Anwar, R., M.S. Masood and M.S. Bhatti. 1993. Role of plant genetic resources in food security. Progressive Farming. 13(5): 14-18.

Books and Catalogs

Afzal, M., Z. Ahmad, M.S. Bhatti and A. Qayyum. 1995. Wheat germplasm catalog Part. 1. Plant Genetic Resources Institute, NARC. pp.103.

Masood, M.S., H. Sato and S. Nasim. 1996. Diversity in Roses. Plant Genetic Resources Institute, NARC. pp.116.

Masood, M.S., M.S. Bhatti, A. Qayyum, N. Kazmi, Z. Ahmad and R. Anwar. 1996. Barley germplasm catalog. Plant Genetic Resources Institute, NARC. pp.77.

Bhatti, M.S., A. Qayyum and N. Kazmi. 1996. Rice germplasm catalog, passport information. Plant Genetic Resources Institute, NARC. pp.67.

Bhatti, M.S. and A. Qayyum. 1996. Chickpea germplasm catalog, passport information. Plant Genetic Resources Institute, NARC. pp.41.

Bhatti, M.S. A. Qayyum, and N. Kazmi. 1996. Plant germplasm catalogue. Plant Genetic Resources Institute, NARC. pp.538.

Plant Genetic Resources Institute. 1994. Annual Report 1994. pp. 69.

Plant Genetic Resources Institute. 1995. Annual Report 1995. pp. 104.

Plant Genetic Resources Institute. 1997. Annual Report 1996. pp. 85.

表 1

LONG TERM EXPLORATION AND COLLECTION PLAN FROM 1981 - 2015

| S. NO. | GROUP | NAME OF CROPS COLLECTED OR TO BE COLLECTED | YEAR OF COLLECTION WITH RESPECT TO AREA OF COLLECTION | | | | | | |
|--------|---------|---|---|----------|--------|--------|------|--------|--------|
| | | | N.F.F.P. | N. AREAS | A.J.K. | PUNJAB | SIND | BALUCH | |
| 1. | CEREALS | Triticum aestivum, Aegilops spp., Hordeum spp., Legumes, Vegetables, Oilseed & other cereals also | | | | | | | 1981 |
| | | Wheat, Cereals, Forages etc. | | 1986 | | | | | |
| | | Wheat, Barley, Chickpea | 1990 | | 1996 | | 1990 | | |
| | | | 1996 | | | | 1990 | | |
| | | Rice, Wheat, Maize, Barley, Oilseeds etc. | | | 1982 | | | | |
| | | Rice, Millet, Maize etc. | 1983 | | 1983 | | 1982 | | |
| | | Rice, Millet, Maize etc. | 1989 | | 1989 | | 1989 | | 1989 |
| | | Rice, Common Millet, Maize etc. | 1991 | | 1991 | | | | |
| | | Wheat, Barley, Millet, Species, Buck Wheat, Maize, Oats | (1998) | | (1998) | | | | (1999) |
| | | Rice, Cereals, Legumes etc. | 1984 | | | | | | |
| | | Rice, Cereals, Legumes etc. | | | | | | | 1985 |
| | | Rice, Fodder, Forages, Cereals etc. | | | | | | 1987 | |
| | | Aegilops Spp., Common Wheat, Durum Wheat, Cereals etc. | | | | | | | 1986 |
| | | Zea Mays | (2001) | (2002) | (2002) | (2001) | | | |

| S. NO. | CROPS | TARGETED SPECIES TO COLLECT | YEAR OF COLLECTION WITH RESPECT TO AREA OF COLLECTION | | | | | |
|--------|---------|---|---|-----------------|-----|----------------|--------|--------|
| | | | NWFP 1994 | N-AREAS 1994 | AJK | PUNJAB 1994 | SIND | BALUCH |
| | | Wheat, Barley, Rye etc. | | | | | | |
| 2. | LEGUMES | Cicer, Vigna, Lentils, Cereals, Fodder, Legumes, etc. Lentil, Cicer arietinum Vigna Spp., Phaseolus, Lentil etc. Lentil, Vigna Spp., etc. Cicer, Lentil, Vigna Spp., Cereals etc. Cultivated & wild Chickpea, Cicer arietinum, Cicer microphyllum, Cicer nurstanicum, Cicer macracanthum Amaranthus Spp., Agropyron, Legumes, Forages etc. Vigna Spp., Lobia, Chickpea Vicia faba, Phaseolus spp., Cowpea, Lentil, Mung, Mash, Cicer, Food Legumes Vigna mungo, Vigna radiata, Vigna acontifolia Cicer arietinum, Wild cicer spp., Lens esculentus, Lathyrus sativus/Odoratus | 1994 | 1994 | | 1994 | 1982 | 1982 |
| | | | | | | 1995 | | |
| | | | | | | 1982 | | |
| | | | | | | 1983 | | |
| | | | | | | 1985 | 1985 | |
| | | | 1992 | 1992 | | 1992 | | |
| | | | 1996 1991 | 1991 | | 1996 1991 | | |
| | | | (2008) | (2008) | | (2007) | | |
| | | | (2014) | (2014) | | (2012) | (2012) | (2013) |
| | | | | | | (2011) | (2011) | (2011) |
| 2. | MILLET | Foxtail Millet, Barnyard Millet, Pearl Millet, Common Millet, Minor Millet etc. | 1987 | 1987 | | | | |

| S. NO. | CROPS | TARGETED SPECIES TO COLLECT | YEAR OF COLLECTION WITH RESPECT TO AREA OF COLLECTION | | | | | |
|--------|---------------------|--|---|----------|-----|--------|--------|--------|
| | | | MPFP | N. AREAS | AJK | PUNJAB | SIND | BALUCH |
| | | Pearl Millet, Barnyard Millet etc. | | | | 1989 | | |
| | | Sorghum, Common Millet, Pearl Millet, Foxtail Millet, Barnyard Millet etc. | | | | 1996 | 1996 | |
| 4. | OIL SEEDS | Brassica Spp., Eruca, Radish, Turnip, Cauliflower etc. Ricinus communis, Eruca spp., Linum usitatissimum (Linseed), Brassica spp., Sesame | (2002) | (2002) | | (2003) | (2003) | (2004) |
| 5. | FIBRE CROPS | Kenaf, Sann etc. | 1990 | 1990 | | 1990 | | |
| 6. | FODDER & FORAGE | Vicia, Trigonella, Astragalus, Aegilops, Barley, Fababeans etc. Oat, Medics, Melilotus, Vicia, Hordeum, Alfalfa etc. Avena sativa, Avena fatua, Melilotus spp., Hordeum vulgare, Hordeum Sponaneum, Medicago Sativa, Trifolium alexadrianum, Trigonella spp., Astragalus, Vicia spp | | | | 1996 | | 1993 |
| 7. | VEGETABLES & FRUITS | Apple, Apricot, Plum, Almond, Walnut, Grapes, Pears, Peach, Cherry etc. Apricot, Apple, Pear, Peach, Almond, Plum, Grapes, etc. Apple, Pear, Walnut, Peach, Pears, Plum, Pomegranate, etc. Grapes, Pistachio, Pears, Peach, Pear, Almond, Walnut etc. Almond, Pear, Plum, Peach etc. | | | | 1982 | 1983 | |
| | | | | | | | 1986 | |
| | | | | | | | 1986 | |
| | | | | | | | 1988 | |
| | | | | | | | 1994 | |
| | | | | | | | 1995 | |
| | | | | | | | (2006) | (2005) |

| S. NO. | CROPS | TARGETED SPECIES TO COLLECT | YEAR OF COLLECTION WITH RESPECT TO AREA OF COLLECTION | | | | |
|--------|--------|--|---|-----------------|-----|--------|-------------|
| | | | MPFP | N. AREAS (2015) | AJK | PUNJAB | SIND BALUCH |
| | | Wild Onion | | | | | |
| | | Turnip, Radish, Spinach, Onion, Cucurbits, Carrot, Sugarbeet etc. | 1983 | 1983 | | | |
| | | Rapbanus sativus, Hibiscus esculentus, Brassica rapa, Brassica oleracea, Solanum Melongena, Cucumis Spp., Tomato, Capsicum Spp. etc. | (2001) | (2002) | | | |
| 8. | OTHERS | Setaria Italicia, Eleusine Coracana, Echinochloa Frumentacea | | (2001) | | (2000) | |

表 2

DOMESTIC EXPLORATION AND COLLECTION OF GERMPLASM

Dec., 1997.

| S.NO. | CROPS COLLECTED | YEAR | AREA | NO. OF SAMPLES |
|--------|---------------------------|------|-------------------------------------|-------------------|
| 1. | Forages, Legumes (ICARDA) | 1993 | Baluchistan | 106 |
| 2. | Wheat (MAFF) | 1994 | Punjab, NWFP | 132 |
| 3. | Curciferous (JICA) | 1994 | Punjab, NWFP | 184 |
| 4. | Fruit Seed (JICA) | 1994 | NWFP, Northern Areas | 158 |
| 5. | Lentil & Chickpea (PGRI) | 1995 | Punjab | 163 |
| 6. | Fruits Seed (JICA) | 1995 | NWFP, Northern Areas | 94 |
| 7. | Mash & Vegetables(PGRI) | 1995 | Punjab | 97 |
| 8. | Legumes (JICA) | 1996 | Punjab, NWFP | 116 |
| 9. | Fodder & Forages (JICA) | 1996 | Punjab, NWFP | 325 |
| 10. | Wheat & Barley (JICA) | 1996 | NWFP, Norther Areas, Baluchistan | 131 |
| 11. | Wheat (JICA) | 1996 | Skardu | 349 |
| 12. | Wheat & Barley (JICA) | 1996 | NWFP, Northern Area | 217 |
| 13. | Millet & Sorghum (PGRI) | 1996 | Sindh | 70 |
| 14. | Millet & Sorghum (JICA) | 1996 | Punjab | 93 |
| 15. | Wild Forages (JICA) | 1997 | Cholistan | 21 |
| 16. | Maize (JICA) | 1997 | Kaghan | 39 |
| TOTAL: | | | | 1946 |

表 3

Annexure-I

INTRODUCTION OF CROP GERMPLASM FROM
INTERNAL & EXTERNAL ORGANIZATION

| S.NO. | CROP SPECIES | YEAR | NO.OF ACCESSIONS | ORGANIZATION |
|--------|--------------------------|------|------------------|------------------|
| 1. | Wheat | 1994 | 155 | NIAR, Japan |
| 2. | Barley | 1994 | 574 | Japan & ICRISAT |
| 3. | Rice | 1994 | 5 | Egypt |
| 4. | Oats | 1994 | 2 | Cyprus |
| 5. | Wild Lentil | 1995 | 30 | ICARDA, Syria |
| 6. | Lentil | 1995 | 29 | ICARDA, Syria |
| 7. | Forage | 1995 | 40 | ICARDA, Syria |
| 8. | Vicia spp | 1995 | 66 | ICARDA, Syria |
| 9. | Lathyrus | 1995 | 58 | ICARDA, Syria |
| 10. | Wild Chickpea | 1995 | 57 | ICARDA, Syria |
| 11. | Chickpea | 1995 | 505 | WSU, USA |
| 12. | Lentil | 1995 | 278 | WSU, USA |
| 13. | Safflower | 1995 | 362 | NGRI, USADA, USA |
| 14. | Phaseolus | 1995 | 4 | NIAR, Japan |
| 15. | Cowpea | 1995 | 4 | NIAR, Japan |
| 16. | Mungbean | 1995 | 20 | NIAR, Japan |
| 17. | Cotton | 1995 | 95 | CRI, Faisalabad |
| 18. | Maize, Rice & Vegetables | 1996 | 198 | North Korea |
| 19. | Wheat | 1996 | 628 | Japan |
| 20. | Corchorus | 1997 | 26 | Faisalabad |
| 20. | Burma Teak | 1997 | 1 | Mayanmer |
| 21. | Oat | 1997 | 201 | USA |
| TOTAL: | | | 3294 | |

表 4

Annexure-II

DIAGNOSIS OF PATHOGEN IN GERMPLASM ACCESSION PRESERVED

| YEAR | CROP | NO. OF ACCESSIONS | | | |
|------------------------------|-----------|-------------------|---------|----------|-----------|
| | | Fungi | Viruses | Bacteria | Screening |
| 1993-94 | Rice | 225 | - | 205 | - |
| | Peas | - | 26 | - | - |
| | Cowpea | - | 50 | - | 50 |
| 1994-95 | Peas | - | 38 | - | 56 |
| | Cowpea | - | 33 | - | 33 |
| | Groundnut | - | 17 | - | - |
| | Rice | 195 | - | - | - |
| | Sorghum | 79 | - | - | - |
| 1995-96 | Mung | 95 | 73 | 73 | - |
| | Mash | 127 | 127 | 127 | - |
| | Moth | 35 | 35 | 35 | - |
| 1996-97 | Lentil | 620 | 11+300* | - | 620 |
| | Mash | - | 23 | - | - |
| | Groundnut | - | 25 | - | - |
| | Sorghum | 25 | - | - | - |
| | Faba bean | - | 150* | - | - |
| * Evaluation during 1997-98. | | 1401 | 403 | 440 | |

表 5

GERMPLASM ACQUISITION

December, 1997

| Year | Exploration and Collection | Donated from Pakistan | Donated from Overseas | Total |
|----------------|----------------------------------|-----------------------------|-----------------------------|-------|
| Before 1992 | 6874 | 1125 | 1000 | 8999 |
| 1993 | 106 | - | - | 106 |
| 1994 | 474 | - | 321 | 795 |
| 1995 | 354 | 1101 | 1913 | 3368 |
| 1996 | 952 | 95 | 826 | 1873 |
| 1997 | 60 | 274 | 20 | 354 |
| TOTAL: | 8820 | 2595 | 4080 | 15495 |

表 6

**GERMPLASM ACCESSIONS STORED YEARLY
IN GENE BANK**

Dec. 1997

| S.NO. | CROP | Before | | | | | Total | |
|---------------|----------------------------|--------|------|------|------|------|--------------|------|
| | | 1992 | 1993 | 1994 | 1995 | 1996 | | 1997 |
| 1. | Wheat | 1499 | 23 | 211 | 20 | 189 | 708 | 2650 |
| 2. | Rice | | - | 810 | 1069 | 3 | 103 | 1985 |
| 3. | Barley | 378 | 23 | 201 | 416 | 125 | 27 | 1170 |
| 4. | Oat | 91 | - | 3 | - | 75 | 212 | 381 |
| 5. | Millet | 777 | 41 | 5 | 43 | 97 | 12 | 932 |
| 6. | Sorghum | 589 | 1 | - | 32 | 63 | 25 | 710 |
| 7. | Mnize | 354 | - | - | 66 | 32 | 56 | 451 |
| 8. | Chickpea | 745 | - | - | 629 | 21 | 5 | 1400 |
| 9. | Lentil | 217 | 33 | - | 450 | 68 | - | 768 |
| 10. | Mung | 597 | - | - | - | 28 | - | 625 |
| 11. | Mnsh | 512 | - | - | 21 | 12 | - | 545 |
| 12. | Misc. Legumes | 295 | 81 | - | 125 | 93 | 38 | 632 |
| 13. | Fruits | 695 | - | 103 | 88 | - | - | 886 |
| 14. | Vegetable | 389 | 1 | 48 | 70 | 17 | - | 525 |
| 15. | Brassica | 689 | - | 136 | 08 | 50 | 17 | 900 |
| 16. | Misc. Oilseed [^] | 110 | - | - | - | - | 57 | 167 |
| 17. | Fibre crops | 239 | - | - | - | 102 | 21 | 362 |
| 18. | Forage | 168 | 15 | - | 40 | 40 | 68 | 331 |
| 19. | Misc.Crops | 75 | - | - | - | - | - | 75 |
| TOTAL: | | | | | | | 15495 | |

[^]: Vicia, Moth, Phaseolus, Lathyrus etc.

^{^^}: G.Nut, Sunflower, Safflower, Soybean etc.

表 7

GERMPLASM DISTRIBUTION WITHIN COUNTRY

Dec., 1997.

| SUPPLIED TO | NO. OF SAMPLES |
|---------------|----------------|
| Punjab | 3229 |
| Sindh | 1272 |
| NWFP | 887 |
| Baluchistan | 577 |
| NARC | 6316 |
| Others Orgns. | 54 |
| PGRI, NARC | 15465 |
| Total: | <u>27800</u> |

| YEAR | NO. of SAMPLES |
|--------|----------------|
| Upto | |
| 1992 | 8152 |
| 1993 | 232 |
| 1994 | 1409 |
| 1995 | 4723 |
| 1996 | 5819 |
| 1997 | 7465 |
| Total: | <u>27800</u> |

表 8

GERMPLASM DISTRIBUTION TO DIFFERENT COUNTRIES

Dec.,1997.

| COUNTRY | NO. OF SAMPLES |
|------------|----------------|
| Argentina | 18 |
| China | 265 |
| Egypt | 10 |
| Germany | 31 |
| India | 360 |
| Iraq | 200 |
| Japan | 1100 |
| Korea | 170 |
| Mexico | 315 |
| Nipal | 100 |
| Philippine | 574 |
| Rome | 23 |
| Srilanka | 79 |
| Syria | 1970 |
| Taiwan | 202 |
| USA | 1221 |
| Total: | <u>6642</u> |

表 9

**VIABILITY TESTS OF GERMPLASM
PRESERVED IN GENE BANK**

December 1997

| S.NO. | CROP | Y-O-T | NO.OF ACCESSIONS |
|-------|-----------|-------|---------------------|
| 1. | Millet | 1993 | 822 |
| 2. | Wheat | 1994 | 2744 |
| 3. | Barley | 1994 | 395 |
| 4. | Oats | 1994 | 108 |
| 5. | Rice | 1994 | 5196 |
| 6. | Sorghium | 1994 | 78 |
| 7. | Mungbean | 1994 | 552 |
| 8. | Mashbean | 1994 | 649 |
| 9. | Lentil | 1994 | 246 |
| 10. | Chickpea | 1994 | 782 |
| 11. | Brassica | 1994 | 802 |
| 12. | Fibre | 1995 | 234 |
| 13. | Lathyrus | 1995 | 211 |
| 14. | Sunflower | 1995 | 67 |
| 15. | Soybean | 1995 | 35 |
| 16. | Forages | 1995 | 126 |
| 17. | Rice | 1995 | 80 |
| 18. | Brassica | 1995 | 143 |
| 19. | Sorghum | 1995 | 599 |
| 20. | Cowpea | 1995 | 135 |
| 21. | Chickpea | 1995 | 89 |
| 22. | Lentil | 1995 | 137 |
| 23. | Maize | 1995 | 7 |
| 24. | Moth | 1995 | 21 |
| 25. | Mashbean | 1995 | 4 |
| 26. | Mungbean | 1995 | 17 |
| 27. | Phaseolus | 1995 | 75 |
| 28. | Vicia | 1995 | 68 |
| 29. | Barley | 1995 | 38 |
| 30. | Millet | 1995 | 54 |
| 31. | Oats | 1995 | 4 |
| 32. | Misc. | 1995 | 34 |
| 33. | Ageilops | 1996 | 50 |

| | | | |
|-----|---------------|------|-----|
| 34. | Barley | 1996 | 769 |
| 35. | Chickpea | 1996 | 335 |
| 36. | Mashbean | 1996 | 485 |
| 37. | Mungbean | 1996 | 386 |
| 38. | Lentil | 1996 | 655 |
| 39. | Wheat | 1996 | 359 |
| 40. | Sorghum | 1996 | 494 |
| 41. | Rice | 1996 | 465 |
| 42. | Vegetable | 1996 | 29 |
| 43. | Prunus | 1996 | 15 |
| 44. | Cowpea | 1996 | 84 |
| 45. | Lathyrus | 1996 | 3 |
| 46. | Phaseolus | 1996 | 1 |
| 47. | Forages | 1996 | 15 |
| 48. | Vicia | 1996 | 21 |
| 49. | Brassica | 1996 | 31 |
| 50. | Oats | 1996 | 129 |
| 51. | Sorghum | 1997 | 413 |
| 52. | Rice | 1997 | 468 |
| 53. | Fodder/Forage | 1997 | 246 |
| 54. | Cotton | 1997 | 103 |
| 55. | Maize | 1997 | 328 |
| 56. | Chickpea | 1997 | 380 |
| 57. | Wheat | 1997 | 675 |
| 58. | Patson | 1997 | 21 |
| 59. | Safflower | 1997 | 21 |
| 60. | Misc.Oil | 1997 | 35 |
| 61. | Fodder | 1997 | 21 |

1993 = 822

1994 = 11552

1995 = 2178

1996 = 4326

1997 = 2711

Total: = 21589 accessions

表10

Sheet2

| PLANT GENETIC RESOURCES INSTITUTE | | | | | | |
|---|-------------------|----------|-----------|-----------|----------|-----------|
| PRESENT STATUS OF <i>IN VITRO</i> PRESERVATION OF | | | | | | |
| VEGETATIVELY PROPAGATED CROPS AND FRUIT TREES GERMPLASM | | | | | | |
| 1993-98 | | | | | | |
| CROP | NO. OF ACCESSIONS | | | | | |
| | 1993 | 1994 | 1995 | 1996 | 1997 | TOTAL |
| POTATO | 1 | | | 3 | | 4 |
| PEACH | | 1 | | | | 1 |
| SWEET POTATO | 1 | | | 13 | | 14 |
| SUGARCANE | | | 14 | 9 | | 23 |
| CITRUS | | | 1 | 1 | | 2 |
| ARTEMISIA | | | 1 | | | 1 |
| BANANA | | | | | 2 | 2 |
| APPLE | | | | | 1 | 1 |
| GRAPE | | | | | 2 | 2 |
| APRICOT | | | 3 | | | 3 |
| GLADUOLUS | | | | | 1 | 1 |
| TOTAL | 2 | 1 | 19 | 26 | 6 | 54 |

表11

Seed Multiplication of Crop Germplasm

| Crop | 1994 | 1995 | 1996 | 1997 | Total |
|----------------|------|------|------|------|--------|
| Maize | 97 | 25 | 331 | — | 453 |
| Mung | — | 325 | — | 720 | 1,045 |
| Cowpea | — | 138 | — | 197 | 335 |
| Aegilops | — | 43 | — | — | 43 |
| Foxtail millet | — | — | 49 | 50 | 99 |
| Panicum | — | — | 48 | — | 48 |
| Wild Chickpea | — | 37 | — | — | 37 |
| Wild Lentil | — | 24 | 30 | — | 54 |
| Wheat | 88 | 1238 | 367 | 1271 | 2,964 |
| Barley | 171 | 397 | 504 | 161 | 1,233 |
| Sorghum | 79 | 371 | 409 | 449 | 1,308 |
| Chickpea | 67 | 222 | 357 | 125 | 771 |
| Rice | 544 | 239 | 466 | — | 1,249 |
| Lentil | — | — | 423 | 200 | 623 |
| Brassica | — | 74 | — | 50 | 124 |
| Buck Wheat | — | — | — | 12 | 12 |
| | | | | | 10,398 |

表12

Evaluation for Morphological Traits

| Crop | 1994 | 1995 | 1996 | 1997 | Characters Studied |
|----------------|------|------|------|------|--------------------|
| Maize | 97 | — | 331 | — | 13 |
| Barley | 171 | 397 | 504 | 161 | 12 |
| Chickpea | — | 222 | 357 | — | 14 |
| Rice | 544 | 239 | 466 | — | 14 |
| Sorghum | 79 | 371 | — | 449 | 18 |
| Durum | 88 | — | 104 | — | 21 |
| Wheat | — | 1238 | 358 | 320 | 21 |
| Brassica | — | 41 | — | — | 15 |
| Blackgram | — | 311 | — | 523 | 18 |
| Mungbean | — | 310 | — | 720 | 17 |
| Lentil | — | — | 423 | — | 8 |
| Cowpea | — | — | — | 197 | 5 |
| Foxtail millet | — | — | — | 50 | 5 |

表13

Germplasm Evaluated

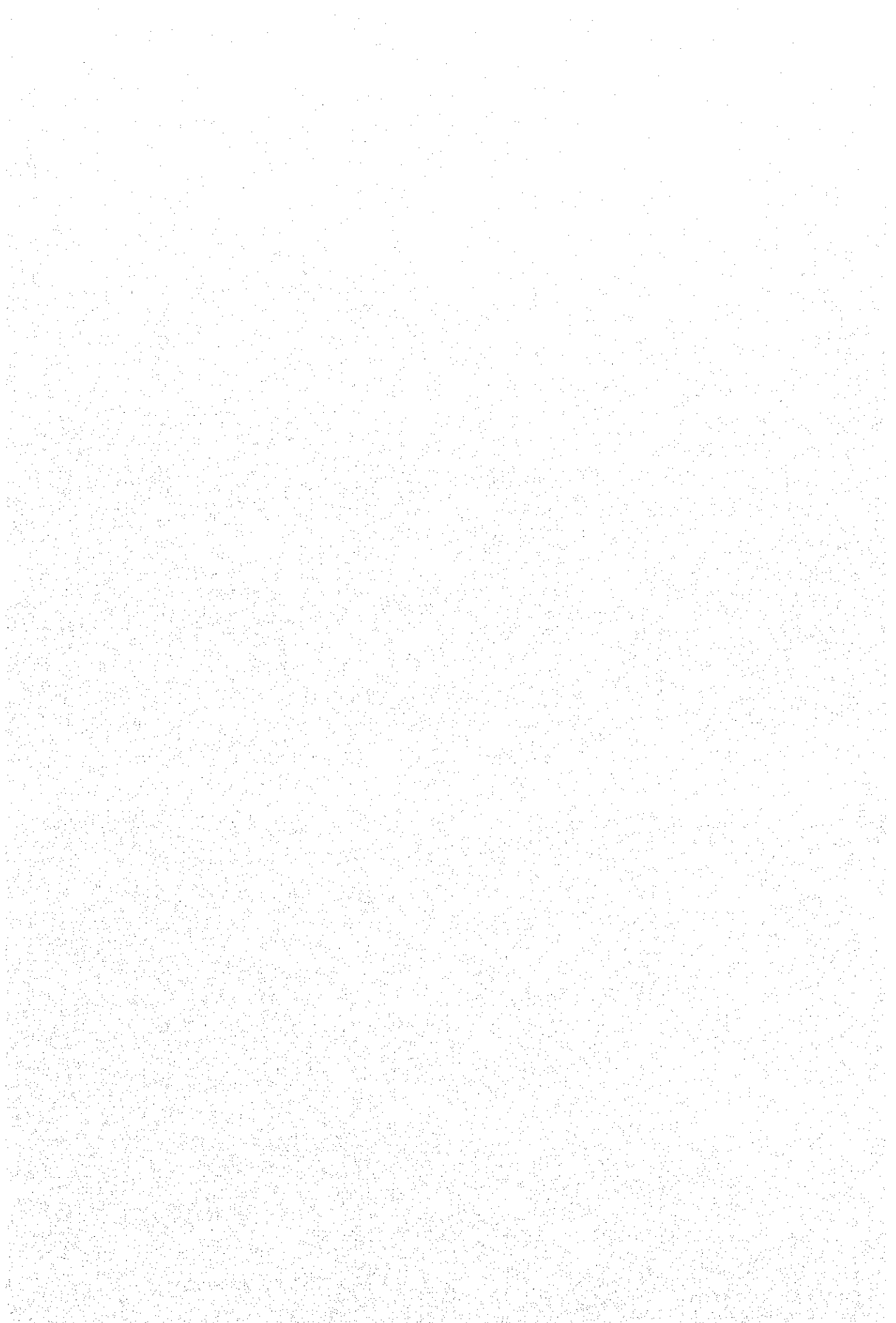
| Crop | Total Acc. in Gene-bank | Evaluated | Percent |
|----------------|-------------------------|------------|------------|
| Maize | 451 | 428 | 95 |
| Barley | 1177 | 1177 | 100 |
| Chickpea | 1400 | 579 | 41 |
| Rice | 1985 | 1249 | 63 |
| Sorghum | 710 | 710 | 100 |
| Durum Wheat | 192 | 192 | 100 |
| Wheat | 2458 | 1916 | 78 |
| Brassica | 941 | 41 | 5 |
| Blackgram | 545 | 545 | 100 |
| Mungbean | 625 | 625 | 100 |
| Lentil | 768 | 423 | 55 |
| Foxtail millet | 50 | 50 | 100 |
| Cowpea | 197 | 197 | 100 |

8,132

表14

Biochemical Evaluation of Crop Germplasm

| Crop | No of Acc. | Technique Used | Year |
|----------|------------|----------------------|---------|
| Wheat | 74 | SDS-PAGE | 1994 |
| Rice | 15 | SDS-PAGE | 1994 |
| Aegilops | 42 | SDS-PAGE | 1995 |
| Chickpea | 70 | Isozyme | 1995 |
| Lathyrus | 12 | SDS-PAGE | 1995 |
| Cotton | 13 | Isozyme | 1995 |
| Mash | 200 | SDS-PAGE | 1995-97 |
| Lentil | 36 | Isozyme | 1996 |
| Lentil | 10 | DNA(RAPD) | 1996 |
| Lentil | 120 | SDS-PAGE | 1997 |
| Wheat | 177 | SDS-PAGE | 1997 |
| Mash | 10 | 2-D, electrophoresis | 1997 |
| Wheat | 5 | 2-D, electrophoresis | 1997 |



JICA